

# For Active Dogs!

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Coaching dog enthusiasts to embrace the unique needs of active dogs through teaching, mentoring and educational media

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## The Genetics of Athletic Success

Greetings!

Dogs are the most physically varied species on earth, having been selected for specific functions - you've surely heard the adage "form follows function."

In a recent study, Dr. Elaine Ostrander and colleagues compared whole-genome sequence data between sport-hunting and terrier breeds, groups at the ends of a continuum in both form and function, as well as a number of other breeds of dogs (1). The goal of the study was to determine what genes might underlie functions that are important for athletic ability.



### Results: 5 Genes/Gene Groups Involved in Performance and Behavior

1. A total of 59 genes were strongly selected for in sport-hunting breeds (spaniels, setters and pointers; retrievers were not examined). These **genes are responsible for muscle, cardiovascular and neurological functions**, which play such an important role in athleticism. They included the following (roles of the genes are in parentheses):

*RYR3* (skeletal muscle contraction)  
*ABLIM3* & *CDH15* (muscle development)  
*ASIC3* (fatigue-enhanced muscle pain)  
*TRPM3* (vascular muscle contraction)  
*UTRN* (muscular dystrophy)  
*ADRB1* & *GRK4* (heart rate and hypertension)  
*ROBO1* & *RIMS1* (neurological development)  
*KCNQ5* & *CDH15* (neurological development)

2. Sport-hunting dogs had a higher level of mutations in the genes *CDH23* and *MSRB3* as compared to terriers. Mutations of these **genes are linked to sensory impairment**, and sport-hunting dogs are considered to be a less noise-sensitive group (because of the need to ignore gun shots) than terriers.

3. An examination of over 1000 agility dogs representing over 100 breeds showed that a specific allele of the ***ROBO1* gene was associated with greater success in USDAA agility**. *ROBO1* encodes a brain protein that guides axons during development, and variations in this gene may result in variable cognitive plasticity. It may affect the ability to identify and acquire environmental information so that task-specific responses can be executed during the sport of agility.

4. An allele of ***TRPM3*** (which functions in vascular smooth muscle contraction) **was significantly associated with increased racing speed in Whippets** (but not Greyhounds), accounting for 11.6% of the total variance in racing performance.

5. The gene ***RSPO2***, which previously had been shown to be **associated with furnishings** (mustache and eyebrows) was selected

### Upcoming Events:

#### For Dog Lovers/Trainers

Sept. 1 - 3, 2018

[Coaching the Canine Athlete Seminar](#)

Coburg, ON, Canada  
Virginia Patten

[csascanada@gmail.com](mailto:csascanada@gmail.com)

Sept. 29 - Oct. 2, 2018

[Coaching the Canine Athlete Seminar](#)

Guides Canins Inc  
St. Lazare (Québec),  
Canada

[chelsea@guidescanins.com](mailto:chelsea@guidescanins.com)

Nov. 17 - 18, 2018

[Canine Sports Medicine and Rehabilitation Conference For Dog Trainers](#)

Frederick, MD

[info@caninesports.com](mailto:info@caninesports.com)

Jan 31, 2019

[NACSW & CNCA Joint Conference](#)

DoubleTree Golf Resort  
Palm Springs  
Cathedral City, CA

[www.cnca.com](http://www.cnca.com)

Feb. 9 - 10, 2019 **NEW!**

[Coaching the Canine Athlete Seminar](#)

Coventry School for Dogs and Their People  
Columbia, MD

[lizcatalano@thecoventryschool.com](mailto:lizcatalano@thecoventryschool.com)

#### For Veterinarians, Physical Therapists and Veterinary Technicians/Nurses

Oct. 12 - 13, 2018

[Massachusetts Veterinary Medical Association Canine Sports Medicine](#)

(9 hours CE)

Seacrest Beach Hotel  
East Falmouth, MA (Cape

for in terriers, as were the **SHANK2** and **OXR1** genes, which are involved in hyperactivity and panic responses.

This study provides strong evidence that various breeds of dogs have been selected improved endurance, cardiac function, blood flow, and cognitive performance, which can affect athletic ability.

**What relevance does this study have to you?** Well, this study suggests that if you are interested in success in athletic competition, you will tip the balance in your favor if you select your next teammate from lines of dogs that have been bred specifically for success in those competitions.

As we learn more about the genetics of dogs, will we eventually identify "the champion genome?"

**References** (Full articles available [here](#)):

1. Jaemin Kim, Falina J. Williams, Dayna L. Dreger, Jocelyn Plassais, Brian W. Davis, Heidi G. Parker, and Elaine A. Ostrander. Genetic selection of athletic success in sport-hunting dogs. PNAS 2018; 115 (30) E7212-E7221

Cod)

[www.massvet.org](http://www.massvet.org)

**Nov. 9 - 11, 2018**

[Canine Sports Medicine Module](#)

Canine Rehabilitation Institute

Coral Springs, FL

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## For Active Dogs! Trivia

Answers to all trivia questions are found in past For Active Dogs! newsletters

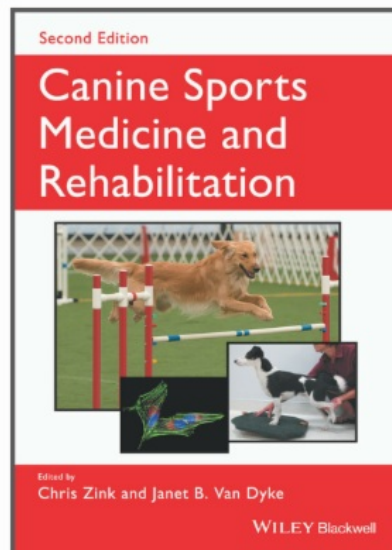
### What is the most common toe injured in agility dogs?

click [here](#) to find out the answer

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