



## STUDY PARTICIPATION FORM

**Study Title:** 02575-MOU Genetic Basis of Exercise-Induced Collapse in Border Collie Related Breeds

**Principal Investigator(s):** James Mickelson, PhD

**Institution(s):** University of Minnesota

**Date Requested:** January 1, 2019

**Collection End Date:** December 31, 2019

### Background and Purpose:

An episodic nervous system disorder triggered by strenuous exercise, termed Border Collie Collapse (BCC), exists in Border Collies and several related breeds. Our study objectives are to define its underlying genetic architecture, heritability, and potentially genomic loci, through analyses of whole-genome DNA marker data. Knowledge of the fraction of the BCC phenotype determined by genetics, as opposed to environment and genotype x environment interaction, and whether major gene mutations are likely to exist, will inform veterinarians, and working/stock dog communities of the true nature of this condition. Future research would entail the identification of a panel of highly informative markers to predict risk in susceptible dogs.

### Type of Study:

- Genetic
- Oncology
- Infectious Disease
- Prevention
- Diagnostic
- Treatment
- Other:

**Disease:** Border Collie Collapse

**Breed(s) Included:** Border Collies, Australian Shepherds, Kelpies, Bearded Collies, Shetland Sheepdogs, and Whippets

### Participation Requirements:

Signed consent form from owners of active dogs of all ages from the desired breeds; including suspected cases of all ages, and controls over 5 years of age.



**Owner's Responsibilities (Samples and Information to be collected):**

Clinical features are collected from owners via 14-page 48-question questionnaires available on our website. To be useful as a suspected BCC case, dogs must have experienced at least two episodes of typical BCC collapse and have provided a video that well illustrates a collapse episode. A 3 - 5 cc blood sample obtained via venipuncture is preferred, although a buccal cheek swab is also accepted.

Please see the Border Collie Collapse Submission Protocol and questionnaires attached.

**Study Contact Info (Primary)**

**Name:** Dr. James Mickelson or Ms. Katie Minor

**Email:** micke001@umn.edu or cgl@umn.edu

**Phone:** 612-624-1246 or 612-624-5322

**Study Web Address:**

[www.vetmed.umn.edu/research/labs/canine-genetics-lab/genetic-research/border-collie-collapse](http://www.vetmed.umn.edu/research/labs/canine-genetics-lab/genetic-research/border-collie-collapse)

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**Border Collie Collapse Submission Protocol**

- Complete either the Normal or Affected "Border Collie Collapse Questionnaire".
- Make a copy of your dog's 3 or 5 generation pedigree if available.
- Make a copy of your dog's medical record if available (affected dogs only).
- Collect a blood or tissue sample (deceased dogs).
- If available, a CD or DVD with a video of your dog's abnormal episodes would be very helpful to our research.

**Blood**

- Draw 5-10 cc's of whole blood in a EDTA tube(s) (Lavender-topped tube in the US).
- Gently invert tubes to distribute the anticoagulant.  
Do not spin, extract serum, or anything further.
- Refrigerate if the sample is being held for a day or more before shipping.

**Tissue (Deceased Dogs)**

- If the dog dies, donating a small skin section will provide DNA for the research.
- If the dog is to be euthanized, first take a blood sample if possible, and send both samples.
- Place a 1" x 1" skin section into a labeled freezer bag. Place in a second bag.
- Freeze if the sample is being held for an extended period of time before shipping.

**Labeling and Forms**

- Label the sample with the following: The dog's call name and the owner's last name and affected/not affected status.
- If you are submitting several dogs' samples together, number each dog's forms and samples to prevent a mix up (Sample #1, #2 etc., accompanies forms #1, #2, etc.)
- Complete an Individual Dog Questionnaire and include a Pedigree with the sample for each dog.

**Shipping**

- Place tubes for each dog into individual plastic bags or a hard plastic container.  
(ex. pill bottle or syringe casing)
- Pack the sample in a small box or insulated container. If the temperature of the location you are shipping from is 80 F or above, include a cool pack.
- Ideally, ship the sample immediately. If you are waiting to ship samples, please refrigerate.
- Ship to arrive within 2-7 days (US Mail, UPS, FedEx, etc.). Samples DO NOT need to be sent overnight.
- Send samples with all forms to:

University of Minnesota  
c/o Katie Minor  
1988 Fitch Ave 295 AS/VM  
St. Paul, MN 55108

If you have questions regarding sample submission please call 612-624-5322 or e-mail [minork@umn.edu](mailto:minork@umn.edu)

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### Border Collie Collapse Questionnaire - Affected Dogs

#### Dog Information

Breed \_\_\_\_\_

 Male  Female  Intact  Neutered/Spayed

Call Name \_\_\_\_\_

Birth Date \_\_\_\_\_ Date of Death \_\_\_\_\_

Reg. Name \_\_\_\_\_

Sire \_\_\_\_\_

Reg. # \_\_\_\_\_

Dam \_\_\_\_\_

What line(s) is your dog from? (Check all that apply):

 Stock Dog  Conformation  Agility/Flyball  Pet  Other \_\_\_\_\_

What activities does your dog routinely participate in? (Check all that apply):

 Working stock Obedience Stock dog trials Conformation Showing Agility Running alongside an ATV or bicycle Fun Retrieves  alone  with other dogs Hiking/Jogging Training Retrieves on land Guide/Service work Flyball Other \_\_\_\_\_

Has your dog had one or more distinct episodes of abnormal posture, gait or collapse that occurred during exercise or excitement during his/her lifetime?

 Yes  No If yes, please also complete the Episode portion of this questionnaire.

#### Owner Information

Name \_\_\_\_\_

Phone \_\_\_\_\_

Street Address \_\_\_\_\_

Alt. Phone \_\_\_\_\_

City, State, Zip \_\_\_\_\_

Fax \_\_\_\_\_

Country \_\_\_\_\_

e-mail \_\_\_\_\_

#### Alternate Contact

Name \_\_\_\_\_

Phone \_\_\_\_\_

Street Address \_\_\_\_\_

Alt. Phone \_\_\_\_\_

City, State, Zip \_\_\_\_\_

Fax \_\_\_\_\_

Country \_\_\_\_\_

e-mail \_\_\_\_\_

## Dog Information

1. How would you judge your dog's body condition right now?

- obese, out of shape
- a little heavy, but in good shape
- in perfect condition
- thin

2. How would you judge your dog's temperament?

- excitable
- normal
- laid back

3. Rank your perception of your dog's aggressiveness, on a scale of 1(low or none) to 5 (high) towards the following:

Other dogs \_\_\_\_\_

People \_\_\_\_\_

His/her territory \_\_\_\_\_

Please describe any perceived aggression or add any additional comments in the space below.

4. Rank your perception of your dog's intensity and desire to retrieve or herd compared to other dogs you have trained, on a scale of 1 (low or none) to 5 (high). Comment below:

5. Rank your perception of your dog's trainability and intelligence compared to other dogs you have trained on a scale of 1(low) to 5 (high). Comment below:

6. Please check all of the following that apply to your dog.

- dog always indoors, in fenced yard, or on a leash
- dog always indoors, or on a leash
- dog is always outdoors in kennel run or a fenced in yard
- dog spends some time outdoors unobserved in an unfenced area
- dog is in training full time
- other (please describe)

7. Compared to other dogs, does your dog seem to be more or less tolerant of high temperatures and/or humidity?

8. Do you use an e-collar for training?  Yes  No

If yes, compared to other dogs you have trained, how does your dog handle repeated correction?

### Episode Information

If your dog has had episodes of abnormal posture, gait or collapse that occurred during exercise or excitement, please complete the rest of this questionnaire.

Has your veterinarian diagnosed the cause of your dog's abnormal episodes?  Yes  No

If so, what was the diagnosis: \_\_\_\_\_

List the results of any tests that were done during your veterinarian's investigation to find the cause of these episodes. (Fax or attach copies of tests if possible, or indicate below from whom they may be obtained)

Test results:

Veterinarian information (please list the veterinarian who did the testing to diagnose the cause of the episodes (if a diagnosis was made) and also list your current Veterinarian

#### Veterinarian who made the diagnosis

Name \_\_\_\_\_

Clinic \_\_\_\_\_

Street Address \_\_\_\_\_

City, State, Zip \_\_\_\_\_

Country \_\_\_\_\_

Phone \_\_\_\_\_

Fax \_\_\_\_\_

e-mail \_\_\_\_\_

#### Current Veterinarian, if different

Name \_\_\_\_\_

Clinic \_\_\_\_\_

Street Address \_\_\_\_\_

City, State, Zip \_\_\_\_\_

Country \_\_\_\_\_

Phone \_\_\_\_\_

Fax \_\_\_\_\_

e-mail \_\_\_\_\_

1. When was your dog's first episode noted (age or date)? \_\_\_\_\_

2. What was the weather (temperature, humidity) like during the first observed episode?

3. What was the dog doing at the time of the episode(s)?

4. What did you see first?

5. If your dog's limbs seemed abnormal during the episode, were the front legs, hind legs, or both involved and in what order? Were all the limbs the same or were there differences between the front and hind legs during the episode?. For example would you describe each limb as being weak, floppy, uncoordinated, or stiff (rigid) compared with normal?

6. Did your dog completely lose the ability to walk or move? If not, please describe how your dog moved/walked during the episode.

7. What did you do, and what happened next? Did your dog's posture or gait change during the episode?

8. Approximately how many episodes has your dog had? (Please answer with a number - even if estimated.)

9. Have all of your dog's observed episodes been very similar, or have there been differences? Please describe any differences and give the particulars of each of the episodes you can recall (including the activity/circumstances precipitating the event, the temperature and humidity at the time of the event and your description of the event).



10. How long do your dog's episodes typically last?

11. Have you noticed any unusual behaviors or any unusual symptoms in your dog immediately prior to any of his/her episodes?  Yes  No (If yes, please describe.)

12. Is there anything that you think seems to make your dog more or less likely to have an episode on a given day?  Yes  No (If yes, please comment.)

13. How long can your dog typically perform the activities that precipitate an episode before you begin to notice a change in their behavior?

14. Would you estimate that the frequency and/or severity of your dog's episodes is changing over time? (increased, decreased, or stayed the same). Do you think it is easier or harder to induce an episode now compared with when you first noted the condition.?

15. Please describe what usually happens from the time your dog's episode stops until he/she is acting and walking 100% normal again, and estimate how long this typically takes.

16. Has your dog ever been evaluated by a veterinarian during or immediately after an episode?  
 Yes  No If yes, what testing was done? What were the findings?

17. Has your dog ever been hospitalized for an episode?  
 Yes  No (If yes, please comment.)

18. How many times has your dog had more than one episode in 24 hours?

- Never
- Once
- 2-4 times
- 5 or more times

19. What time of day are a majority of your dog's episodes?

10 PM - 6 AM

6 AM - 2 PM

2 PM - 10 PM

variable

20. Is your dog always completely alert and aware during each episode?

Yes  No If not, please describe any abnormalities in your dog's mental condition during the episode (i.e. disoriented, unconscious, etc.) .

21. Is your dog always completely alert and aware after each episode?

Yes  No If not, please describe any abnormalities in your dog's mental condition or behavior (ie disoriented, unconscious, sleepy, agitated, anxious) that you may have noticed during recovery or in the time after an episode and estimate how long these abnormalities persisted.

22. Have you taken your dog's temperature during an episode of collapse?

Yes  No If so, what was it?

23. Have you ever noticed a change in the color of your dog's urine during or after an episode?

Yes  No If yes, please elaborate

24. Have you ever noticed a change in the color of your dog's gums during an episode?

Yes  No If yes, please elaborate.

25. Between episodes (other than the first 24h after an episode) does your dog seem normal to you?

Yes  No If no, please comment.

26. Is your dog on any medication(s) or other treatments to control the episodes?  Yes  No

If yes, please give type, current dosage and frequency of dosing.

(ie Phenobarbital 60mg, 1 tablet twice a day).

27. If your dog is on medication(s), how would you describe the level of control of the episodes?

Good control - no episodes even after participating in trigger activities

Fair control - my dog has less episodes than before and it seems more difficult to induce an episode

Poor control - the frequency and severity of episodes has not changed while on the medications

No control - the frequency and severity of episodes has worsened while on the medications

28. Does your dog take any other medications or supplements?

29. Have you noticed any other factors that seem to relate to ease/ difficulty of episode control or that appear to “trigger” episodes in your dog?  Yes  No (If yes, please comment.)

30. Do you usually feed your dog a commercial dog food?

Yes  No If so, what brand and what time(s) of day do you feed your dog?

31. Indicate the age of your residence where your dog lived at the time the episodes began.

- less than 10 years old
- 10 to 30 years old
- 31 to 50 years old
- more than 50 years old
- unknown

32. How long had you lived in the residence when your dog's episodes began?

- less than one year
- 1 to 5 years
- 6 to 10 years
- more than 10 years

33. Has your dog ever had any major traumatic injuries such as being hit by a car, kicked by livestock, or major fight injuries?  Yes  No If yes, please describe the injury and indicate whether the injury occurred before or after the first observed episode in your dog. If it occurred after the episodes began, estimate whether the frequency and/or severity of the episodes has increased, decreased, or stayed the same since the injury.

34. Does your dog have any current medical problems other than these episodes?

- Yes  No If yes please list the medical problem, indicate when it was first diagnosed, whether it is being treated and the treatment used.

35. Has your dog had major medical problems in the past other than these episodes?

- Yes  No If yes, please list.

36. Has your dog ever had a typical epileptic seizure, where he/she falls over, loses consciousness and paddles his/her legs?  Yes  No If yes, please describe these seizure(s), how often they occur and when they were first observed in your dog.

37. Are you aware of any problems your dog or his/her dam had related to your dog's birth (such as prolonged delivery, maternal illness, high sibling death rate, etc.) ?

- Yes  No  Unknown (If yes, please list.)

38. Did your dog have any major illnesses during his/her first 6 months of life?  
 Yes  No  Unknown If yes, please elaborate and indicate dates.

39. Did your dog receive routine puppy vaccinations against distemper and parvovirus at approximately 6-8,10-12, and 14-16 weeks of age?  Yes  No  Unknow (If this was not the vaccine schedule used, please indicate all known vaccinations your dog received during the first 6 months of life).

40. In regards to vaccinations please indicate the following.

Month and year of your dog's most recent distemper/parvovirus combination vaccination \_\_\_\_\_

Month and year of your dog's most recent rabies vaccination \_\_\_\_\_

41. Is your dog receiving heartworm preventative? With what product?

42. Are you aware of episodes similar to those your dog is experiencing in any of your dog's relatives (full-sibs, half-sibs, sire, dam, grandparents, or aunts or uncles)?

43. Have you bred this dog?

Yes  No (If yes, how many litters and total offspring?)

44. Do any of your dog's offspring have similar episodes?

45. Are you aware of typical epileptic seizures (episodes of falling over, losing consciousness and paddling legs?) in any of your dog's relatives (full-sibs, half-sibs, sire, dam, grandparents, aunts or uncles or offspring)? If so, please describe the relationship.



46. Use this space for any other information about your dog that you would like to provide. If you have a video of your dog's collapse episodes, please paste a link to the video here.

47. If your dog is deceased, please describe the cause or circumstances of death.

I understand the above questions and have supplied complete and accurate information, to the best of my knowledge. I understand that this information will be available only to researchers directly involved in the study and that any publication (s) resulting from this research will refer to dogs by an anonymous code number only. I give the researchers directly involved in the study permission to contact my veterinarian(s) and to access information from my dog's medical record. I consent to the use of this information in this manner.

Signed \_\_\_\_\_

Date \_\_\_\_\_

Thank you for your time.

Please fax or attach 3 or 5 generation pedigree and a copy of your dog's medical record and relevant diagnostic tests (if possible). Please return this questionnaire to:

**University of Minnesota**  
**C/O Katie Minor**  
**295 AnSci VetMed**  
**1988 Fitch Ave**  
**St. Paul, MN 55108**  
**Phone: 612-624-5322**  
**Fax: 612-625-0204**  
**e-mail: [minorok@umn.edu](mailto:minorok@umn.edu)**

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## Border Collie Collapse Questionnaire - Normal Dogs

### Dog Information

Breed \_\_\_\_\_

Male  Female  Intact  Neutered/Spayed

Call Name \_\_\_\_\_

Birth Date \_\_\_\_\_ Date of Death \_\_\_\_\_

Reg. Name \_\_\_\_\_

Sire \_\_\_\_\_

Reg. # \_\_\_\_\_

Dam \_\_\_\_\_

What line(s) is your dog from? (Check all that apply):

Stock Dog  Conformation  Agility/Flyball  Pet  Other \_\_\_\_\_

What activities does your dog routinely participate in? (Check all that apply):

- |  |  |
|--|--|
| <input type="checkbox"/> Working stock   | <input type="checkbox"/> Obedience                           |
| <input type="checkbox"/> Stock dog trials  | <input type="checkbox"/> Conformation Showing                |
| <input type="checkbox"/> Agility   | <input type="checkbox"/> Running alongside an ATV or bicycle |
| <input type="checkbox"/> Fun Retrieves <input type="checkbox"/> alone <input type="checkbox"/> with other dogs | <input type="checkbox"/> Hiking/Jogging                      |
| <input type="checkbox"/> Training Retrieves on land  | <input type="checkbox"/> Guide/Service work                  |
| <input type="checkbox"/> Flyball   | <input type="checkbox"/> Other _____                         |

Has your dog had one or more distinct episodes of abnormal posture, gait or collapse that occurred during exercise or excitement during his/her lifetime?

Yes  No If yes, please stop, and complete the AFFECTED dog questionnaire.

### Owner Information

Name \_\_\_\_\_

Phone \_\_\_\_\_

Street Address \_\_\_\_\_

Alt. Phone \_\_\_\_\_

City, State, Zip \_\_\_\_\_

Fax \_\_\_\_\_

Country \_\_\_\_\_

e-mail \_\_\_\_\_

### Alternate Contact

Name \_\_\_\_\_

Phone \_\_\_\_\_

Street Address \_\_\_\_\_

Alt. Phone \_\_\_\_\_

City, State, Zip \_\_\_\_\_

Fax \_\_\_\_\_

Country \_\_\_\_\_

e-mail \_\_\_\_\_

## Dog Information

1. How would you judge your dog's body condition right now?

- obese, out of shape
- a little heavy, but in good shape
- in perfect condition
- thin

2. How would you judge your dog's temperament?

- excitable
- normal
- laid back

3. Rank your perception of your dog's aggressiveness, on a scale of 1(low or none) to 5 (high) towards the following:

Other dogs \_\_\_\_\_

People \_\_\_\_\_

His/her territory \_\_\_\_\_

Please describe any perceived aggression or add any additional comments in the space below.

4. Rank your perception of your dog's intensity and desire to retrieve or herd compared to other dogs you have trained, on a scale of 1 (low or none) to 5 (high). Comment below:

5. Rank your perception of your dog's trainability and intelligence compared to other dogs you have trained on a scale of 1(low) to 5 (high). Comment below:

6. Please check all of the following that apply to your dog.

- dog always indoors, in fenced yard, or on a leash
- dog always indoors, or on a leash
- dog is always outdoors in kennel run or a fenced in yard
- dog spends some time outdoors unobserved in an unfenced area
- dog is in training full time
- other (please describe)

7. Compared to other dogs, does your dog seem to be more or less tolerant of high temperatures and/or humidity?

8. Do you use an e-collar for training?  Yes  No

If yes, compared to other dogs you have trained, how does your dog handle repeated correction?

9. Is your dog always completely alert and aware after exercise?

Yes  No

If not, please describe any abnormalities in your dog's mental condition or behavior (ie disoriented, unconscious, sleepy, agitated, anxious) that you may have noticed during recovery or in the time after an episode and estimate how long these abnormalities persisted.

10. Has your dog ever had any major traumatic injuries such as being hit by a car, kicked by livestock, or major fight injuries?  Yes  No If yes, please describe the injury and indicate whether the injury occurred before or after the first observed episode in your dog. If it occurred after the episodes began, estimate whether the frequency and/or severity of the episodes has increased, decreased, or stayed the same since the injury.

11. Does your dog have any current medical problems?

Yes  No

If yes please list the medical problem, indicate when it was first diagnosed, whether it is being treated and the treatment used.

12. Has your dog had major medical problems in the past?

Yes  No If yes, please list.

13. Has your dog ever had a typical epileptic seizure, where he/she falls over, loses consciousness and paddles his/her legs?  Yes  No If yes, please describe these seizure(s), how often they occur and when they were first observed in your dog.

14. Are you aware of any problems your dog or his/her dam had related to your dog's birth (such as prolonged delivery, maternal illness, high sibling death rate, etc.) ?

Yes  No  Unknown (If yes, please list.)

15. Did your dog have any major illnesses during his/her first 6 months of life?

Yes  No  Unknown If yes, please elaborate and indicate dates.

16. Did your dog receive routine puppy vaccinations against distemper and parvovirus at approximately 6-8,10-12, and 14-16 weeks of age?  Yes  No  Unknow (If this was not the vaccine schedule used, please indicate all known vaccinations your dog received during the first 6 months of life).

17. In regards to vaccinations please indicate the following.

Month and year of your dog's most recent distemper/parvovirus combination vaccination \_\_\_\_\_

Month and year of your dog's most recent rabies vaccination \_\_\_\_\_

18. Is your dog receiving heartworm preventative? With what product?

19. Do you usually feed your dog a commercial dog food?

Yes  No If so, what brand and what time(s) of day do you feed your dog?

20. Does your dog take any other medications or supplements?

21. Are you aware of collapsing episodes in any of your dog's relatives (full-sibs, half-sibs, sire, dam, grandparents, or aunts or uncles)?

22. Have you bred this dog?

Yes  No (If yes, how many litters and total offspring?)

23. Do any of your dog's offspring have collapsing episodes?

24. Are you aware of typical epileptic seizures (episodes of falling over, losing consciousness and paddling legs?) in any of your dog's relatives (full-sibs, half-sibs, sire, dam, grandparents, aunts or uncles or offspring)? If so, please describe the relationship.



25. Use this space for any other information about your dog that you would like to provide.

26. If your dog is deceased, please describe the cause or circumstances of death.

**Current Veterinarian**

Clinic \_\_\_\_\_

Street Address \_\_\_\_\_

City, State, Zip \_\_\_\_\_

Country \_\_\_\_\_

Name \_\_\_\_\_

Phone \_\_\_\_\_

Fax \_\_\_\_\_

e-mail \_\_\_\_\_

I understand the above questions and have supplied complete and accurate information, to the best of my knowledge. I understand that this information will be available only to researchers directly involved in the study and that any publication(s) resulting from this research will refer to dogs by an anonymous code number only. I give the researchers directly involved in the study permission to contact my veterinarian(s) and to access information from my dog's medical record. I consent to the use of this information in this manner.

Signed \_\_\_\_\_

Date \_\_\_\_\_

Thank you for your time.

Please fax or attach 3 or 5 generation pedigree.

### **Sample Collection**

- Draw 5-10 cc's of whole blood in a EDTA tube(s) (Lavender-topped tube in the US).
- Gently invert tubes to distribute the anticoagulant: **Do not spin, extract serum, or anything further.**
- Label the tube with the dog's call name and the owner's last name.
- Refrigerate if the sample is being held for any time before shipping.

### **Labeling and Forms**

- Label the sample with the following: The dog's call name and the owner's last name and affected/not affected status.
- If you are submitting several dogs' samples together, number each dog's forms and samples to prevent a mix up (Sample #1, #2 etc., accompanies forms #1, #2, etc.)
- Complete an Individual Dog Questionnaire and include a Pedigree with the sample for each dog.

### **Shipping**

- Place tubes for each dog into individual plastic bags or a hard plastic container.  
(ex. pill bottle or syringe casing)
- Pack the sample in a small box or insulated container. If the temperature of the location you are shipping from is 80 F or above, include a cool pack.
- Ideally, ship the sample immediately. If you are waiting to ship samples, please refrigerate.
- Ship to arrive within 2-7 days (US Mail, UPS, FedEx, etc.). Samples DO NOT need to be sent overnight.
- Send samples with all forms to:

**University of Minnesota  
C/O Katie Minor  
295 AnSci VetMed  
1988 Fitch Ave  
St. Paul, MN 55108  
Phone: 612-624-5322  
Fax: 612-625-0204  
e-mail: [minork@umn.edu](mailto:minork@umn.edu)**