

Case study

Canine behavioral genetics project

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Study overview

The objective of this genetic research project is to study canine anxiety disorders. The findings from this research may be translated into discovery of novel pathways to study in human psychiatric disease.

Over the course of the study, the researchers will collect between 200 to 400 canine samples[†]. Typically, genome-wide association studies (GWAS) conducted on animal populations require the use of a blood draw to obtain a usable DNA sample. Buccal swabs typically do not provide enough DNA yield or quality to satisfy the input requirements for high-throughput SNP arrays. However, the researchers for this study preferred the use of a non-invasive method for sample collection that could be administered remotely and by mail. In order to select the best collection method for their needs, the researchers conducted a comparative assessment of genotyping results using paired blood and Performagene™ saliva samples.

Blood samples were purified using the Qiagen Puregene kit and Performagene saliva samples were purified using the Performagene purification reagents according to the respective manufacturer protocols. DNA from all samples was analyzed using Illumina's Infinium Canine SNP20 genotyping array.

Main challenges

Primary challenges for most GWAS include the ability to collect, transport and store reliable samples and maximize compliance while minimizing overall cost and complexity. The researchers for this study also needed to collect high quality samples from animals located in rural and international settings. Blood samples would require overnight, carrier shipping to ensure their integrity. In addition, many pet owners were reluctant to have a blood draw performed on their animal due to the inconvenience of travelling to a veterinary clinic, concerns about their dogs' pain/anxiety related to blood draws, or legal proscriptions against obtaining blood from dogs for research in some countries.

Collection methods considered

Collection methods considered for this project included whole blood, buccal swabs and Performagene DNA collection kits.

"Our findings validate the use of saliva-obtained samples for genome-wide association studies in canines, highlighting an alternative means of collecting samples in a convenient and non-invasive manner."



DNA collection

[†] This data was generated using a previous version of the product (Oragene•ANIMAL). Please contact us for more information.

Results

The researchers determined that owners were more conducive to returning the Performagene kits than to agree to a blood sample. Surveys sent out with the kits also indicated that the owners found the collection to be very easy. The sample collection was successful for all participants and the process took less than 10 minutes.

High-throughput array-based SNP genotyping was performed with excellent results. The samples achieved very high overall genotype call rates (>99.5%) with very good concordance.

Table 1: Concentration, purity and concordance of saliva-versus blood-extracted DNA samples

Saliva†	Concentration (ng/μL)		A ₂₆₀ /A ₂₈₀	Concordance (%)
	11	125.5 (46.9–212.4)	1.67 (1.39–1.86)	–
Blood	5	384.4 (317–521.2)	1.96 (1.84–2.24)	–
Saliva vs. blood	4	–	–	99.9 (99.9–100)

Mean values plus ranges for DNA concentration and 260/280 ratios (as a measure of purity) as calculated by NanoDrop spectrophotometer for saliva and blood samples, and mean genotype concordance for individuals represented by both saliva and blood. Concordance is the proportion of agreeing genotype calls over total genotypes that were called for both samples (saliva and blood).

Source—tissue source of DNA extraction; n—number of dogs. doi:10.1371/journal.pone.0010809.t001

Source: Yokoyama JS, Erdman CA, Hamilton SP (2010) Array-Based Whole-Genome Survey of Dog Saliva DNA Yields High Quality SNP Data. PLoS ONE 5(5): e10809. doi:10.1371/journal.pone.0010809

“Our results demonstrate that saliva collection from dogs is facile, convenient, and yields large amounts of high-quality DNA that provide excellent performance on high-throughput whole genome arrays.”

Why is Performagene the preferred collection method for this study?

The researchers found the Performagene DNA collection kits very favorable due to their ease-of-use and non-invasive approach, making them a preferred method of sample collection for future studies when collection of blood is impractical. The ability to send the kits via regular mail to owners in rural or international locations maximized owner convenience and improved the compliance rates. In addition, Performagene allowed the researchers to reduce costs and complexity associated with sample transportation and storage. The kits provided high quality DNA with sufficient quantities for high-throughput genotyping.

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