



# Interbreed variation in serum serotonin (5-hydroxytryptamine) concentration in healthy dogs<sup>☆</sup>

K. Höglund, DVM, PhD <sup>a,\*</sup>, J. Häggström, DVM, PhD <sup>b</sup>,  
 S. Hanås, DVM <sup>b,c</sup>, A.-C. Merveille, DVM, PhD <sup>d</sup>, V. Gouni,  
 DVM, PhD <sup>e,f</sup>, M. Wiberg, DVM, PhD <sup>g</sup>, J. Lundgren Willesen,  
 DVM, PhD <sup>h</sup>, K. Mc Entee, DVM, PhD <sup>d,i</sup>, L. Mejer Sørensen,  
 DVM <sup>h</sup>, L. Tiret, DVM, PhD <sup>j</sup>, E.H. Seppälä, PhD <sup>k</sup>, H. Lohi,  
 PhD <sup>k</sup>, V. Chetboul, DVM, PhD <sup>e,f</sup>, M. Fredholm, DVM, PhD <sup>h</sup>,  
 A.-S. Lequarré, DVM, PhD <sup>d</sup>, I. Ljungvall, DVM, PhD <sup>b</sup>

<sup>a</sup> Department of Anatomy, Physiology and Biochemistry, Swedish University of Agricultural Science, Uppsala, Sweden

<sup>b</sup> Department of Clinical Sciences, Swedish University of Agricultural Science, Uppsala, Sweden

<sup>c</sup> Evidensia Animal Clinic, 723 41 Västerås, Sweden

<sup>d</sup> Department of Clinical Sciences, University of Liège, Belgium

<sup>e</sup> Université Paris-Est, Ecole Nationale Vétérinaire d'Alfort, Unité de Cardiologie d'Alfort, Maisons-Alfort Cedex, France

<sup>f</sup> Inserm, U955, Equipe 3, Créteil Cedex, France

<sup>g</sup> Department of Equine and Small Animal Medicine, University of Helsinki, Finland

<sup>h</sup> Department of Veterinary Clinical Sciences, University of Copenhagen, Denmark

<sup>i</sup> Laboratory of Physiology and Pharmacology, Université Libre de Bruxelles, Belgium

<sup>j</sup> U955 IMRB, Team 10, Inserm, Ecole nationale vétérinaire d'Alfort, UPEC, Maisons-Alfort, France

Planning of the study started in 2007. The study protocol was finalized in 2008. There was a follow-up meeting in 2010. The current manuscript was finalized and approved by the investigators in February 2018. The publication committee consisted of Katja Höglund, Ingrid Ljungvall, and Jens Häggström.

Presented in part at the 26th European College of Veterinary Internal Medicine—Companion Animal Congress, Gothenburg, Sweden, September 2016.

<sup>☆</sup> A unique aspect of the Journal of Veterinary Cardiology is the emphasis of additional web-based materials permitting the detailing of procedures and diagnostics. These materials can be viewed (by those readers with subscription access) by going to <http://www.sciencedirect.com/science/journal/17602734>. The issue to be viewed is clicked and the available PDF and image downloading is available via the Summary Plus link. The supplementary material for a given article appears at the end of the page. To view the material is to go to <http://www.doi.org> and enter the doi number unique to this paper which is indicated at the end of the manuscript.

\* Corresponding author.

<https://doi.org/10.1016/j.jvc.2018.05.002>

1760-2734/© 2018 Elsevier B.V. All rights reserved.

<sup>k</sup>Research Programs Unit, Molecular Neurology, University of Helsinki and Folkhälsan Institute of Genetics, Finland

Received 27 October 2017; received in revised form 4 May 2018; accepted 14 May 2018

## KEYWORDS

Breed difference;  
Biomarker;  
Canine;  
Heart valve;  
5-HT

**Abstract** *Introduction:* Serotonin (5-hydroxytryptamine [5-HT]) has several biological functions. In different species, excessive 5-HT has been linked to valvular lesions, similar to those seen in dogs with myxomatous mitral valve disease. Previous studies suggest higher 5-HT in healthy Cavalier King Charles Spaniels (CKCSs), a breed highly affected by myxomatous mitral valve disease, compared to other breeds.

*Objective:* To investigate potential interbreed variation in serum 5-HT in healthy dogs.

*Animals:* 483 healthy dogs of nine breeds aged 1–7 years.

*Methods:* Dogs were examined at five European centers. Absence of cardiovascular, organ-related, or systemic diseases was ensured by thorough clinical investigations including echocardiography. Serum was frozen and later analyzed by enzyme-linked immunosorbent assay (ELISA).

*Results:* Median 5-HT concentration was 252.5 (interquartile range = 145.5–390.6) ng/mL. Overall breed difference was found ( $p < 0.0001$ ), and 42% of pairwise breed comparisons were significant. Univariate regression analysis showed association between serum 5-HT concentration and breed, center of examination, storage time, and sex, with higher 5-HT in females. In multiple regression analysis, the final model had an adjusted  $R^2$  of 0.27 with breed ( $p < 0.0001$ ), center ( $p < 0.0001$ ), and storage time ( $p = 0.014$ ) remaining significant. Within centers, overall breed differences were found at 3/5 centers ( $p \leq 0.028$ ), and pairwise comparisons within those centers showed breed differences in 42% of comparisons. Among the included breeds, Newfoundlands, Belgian Shepherds and CKCSs had highest 5-HT concentrations.

*Conclusions:* Interbreed variation in serum 5-HT concentration was found in healthy dogs aged 1–7 years. These differences should be taken into account when designing clinical studies.

© 2018 Elsevier B.V. All rights reserved.

## Abbreviations

CKCS	Cavalier King Charles Spaniel
CV	coefficient of variation
IQR	interquartile range
MMVD	myxomatous mitral valve disease
5-HT	5-hydroxytryptamine

## Introduction

The neurotransmitter serotonin (5-hydroxytryptamine, 5-HT) has several important biological functions, including regulation of mood, sleep, energy homeostasis, platelet function, and cardiovascular tone [1–5], thus controlling diverse functions in the central as well as peripheral

nervous system [2]. The 5-HT system is also important in cardiac valvular development and in maintaining normal valvular and myocardial function [6–9]. Altered 5-HT signaling has been suggested to be involved in the pathogenesis of myxomatous mitral valve disease (MMVD) in dogs [10–14] and might be especially important in the early development of the disease [15,16].

In the blood, 5-HT is mainly stored in dense platelet granules, and in healthy dogs and people, plasma concentrations are low [13,17,18]. In people receiving oral serotonergic medication, cardiac valvulopathy has been observed [19,20], and in animal models, rats injected with 5-HT developed myxomatous-like valvular changes [21,22]. In dogs with naturally occurring MMVD, 5-HT concentrations in mitral valve leaflets and left ventricular myocardium have been shown to be higher than in healthy

Download English Version:

<https://daneshyari.com/en/article/8484425>

Download Persian Version:

<https://daneshyari.com/article/8484425>

[Daneshyari.com](https://daneshyari.com)