

## Non-invasive Respiratory Function Assessment in Brachycephalic Dogs.

Veterinary clinical research at the Queen's Veterinary School Hospital University of Cambridge, UK

**Background :** A number of dog breeds, including the high profile breeds Bulldogs, French Bulldogs and Pugs, have a shortened skull and flattening of the muzzle, known as brachycephaly. Unfortunately those exaggerated traits are sometimes accompanied by changes to the upper respiratory tract that result in Brachycephalic Obstructive Airway Syndrome (BOAS). Clinical features of BOAS may include snoring, panting, exercise intolerance, respiratory distress, regurgitation, acute overheating, cyanosis, collapse and even death. *Thus it is important to investigate the detailed relationship between skull shape, breed and clinical condition in BOAS in order to plan and perform adequate treatments and/or surgical interventions*

**Whole Body Barometric Plethysmography (WBBP) :** WBBP is a non-invasive respiratory function test that can be applied to brachycephalic dogs. The dog is placed in a transparent chamber and is monitored whilst breathing naturally for 30 minutes (Figure 1). The chamber pressure changes generated by the dog's breathing are translated to a variety of respiratory parameters. The WBBP data provide the opportunity to understand brachycephalic respiratory strategies and patterns. Moreover, one is able to follow the progress of respiratory disease and develop models for prognosis by monitoring the changes in respiratory patterns. At the present, objective evidence of improvement after upper airway tract corrective surgery it has been found and proved that respiratory function can be assessed in brachycephalic dogs using WBBP

**Skull measurements:** *The skull dimensions are of major interest in brachycephalic dogs.* Clinical diagnostic tools, radiography and CT scans, can be used to perform the skull measurements. Our hypothesis of this study is that the skull measurements are able to predict the development of BOAS. Our preliminary results have shown that the skull dimensions are significantly distinguishable between pugs, French bulldogs, and English bulldogs. *Preliminary associations between skull dimensions and respiratory function (respiratory parameters obtained from WBBP) were also found.*

**Genetic work :** *This study aims at defining the genetic basis of BOAS and to associate the genotypic and phenotypic abnormalities that affect respiratory function in brachycephalic dogs.* The way we do this is by running a very large set of DNA tests on each dog, using cheek swab samples collected from many dogs. By testing a large number of both healthy brachycephalic dogs and BOAS-affected dogs, together with the WBBP measurements, we expect to identify the genes of interest in BOAS.



**Significance of the Study :** The initial findings of our study have provided objective characterisation of the respiratory cycle of brachycephalic dogs and its relationship to the skull dimensions. However, we would like to also study healthy brachycephalic dogs to gain information about the frequency with which BOAS is seen in the breed, to have controls against which to compare our clinically affected dogs and to see if we can use WBBP as a screening test for BOAS. The study targets include both healthy brachycephalic dogs and BOAS-affected dogs.

**The long-term aim of this study is to improve the health and welfare of brachycephalic breeds by reducing the incidence of severe BOAS and give them a better quality of life.**

**The French Bulldog Club of England is pleased to be assisting in this important study.**

**Commencing in June 2013**