ABSTRACT

The olfactory acuity of dogs has resulted in them being trained for a wide range of applied tasks, including the detection and alert of medical conditions and states. Anecdotal reports of dogs signaling hypoglycemia in people with type 1 diabetes suggest that dogs can detect odour cues that signal physiological changes. I present a series of studies examining the training and testing of hypoglycemia detection and alert dogs. I first present a training program for training dogs with no previous detection training to detect human breath samples. The efficacy of the training program was then evaluated by testing four dogs’ ability to 1) discriminate between breath samples from three different people and, 2) discriminate between breath samples from one person donated at three different times of the day. The results showed that all four dogs could discriminate the breath samples with a high degree of accuracy. Next, I present and test a method for maintaining breath sample integrity over time. Breath samples were prepared using silicone-coated cotton and uncoated cotton and four dogs’ detectability of the samples were tested over time. The results showed that silicone-coated cotton balls did not improve dogs’ detectability two hours after breath sample preparation, but greatly improved two dogs’ detectability of breath samples stored over four weeks. Finally, I tested four dogs’ ability to discriminate between breath samples donated by people with type 1 diabetes when their blood sugar was low, normal, and high. I then tested two dogs’ ability to generalize the odour of hypoglycemia across multiple breath samples from one individual, and tested the ability of one dog to generalize the odour of hypoglycemia across breath samples from different individuals. The results showed that all four dogs could discriminate between the breath samples from different glycemic states (accuracy 93.3%-100%). One dog (of two tested) generalized the odour of hypoglycemia across multiple breath samples from the same person (Specificity 89%; Sensitivity 62%). More research is needed to determine whether the same dog could generalize the odour of hypoglycemia across breath samples from different people.