Covid-19 olfactory screening test using trained dogs

Press release from the National Academy of Medicine and the Veterinary Academy of France

August 28, 2020

The dog's extraordinary olfactory acuity has long been used by customs to detect explosives, drugs or certain foodstuffs and by first aid teams mobilized in the event of a disaster to search for buried people. Similarly, this faculty is used in the medical field to detect human (cancer, malaria, Clostridium difficile, Parkinson's disease, etc.) or animal (bovine pestivirosis, scabies) diseases [1]. The idea of using dog olfactory tests to detect patients suffering from Covid-19 has been considered by multidisciplinary teams (veterinarians, physicians, biologists, dog handlers) to meet the worldwide demand for a rapid, simple, non-invasive, sensitive and specific screening test that can reduce the workload of medical biology laboratories. Indeed, in view of the increasing demand for Covid-19 detection tests, the use of "sniffer dogs" would reduce the still excessively long delays in obtaining RT-PCR screening, especially for suspicious cases and contacts [2].

It is important to note that while some pets may have been infected by their owners with Covid-19, dogs are not very susceptible to infection. They sometimes develop minor forms but do not transmit Sars CoV-2 to humans.

First results obtained by a German and a French team, using new medical biology olfactory tests, show that trained "sniffer dogs" are able to recognize a specific smell of Covid-19 corresponding to a set of specific volatile organic compounds or other metabolic substances produced by the diseased organism, called volatiloma or VOC (volatile organic compounds). Present in the bloodstream, the volatiloma can be excreted in exhaled air, urine, saliva, faeces, milk and sweat. It is a complex association with endogenous or exogenous substances (solid or liquid food ingested, hygiene products used, medicines...). For this reason, dogs must be trained for two to three weeks for the recognition of a specific smell, an aptitude validated by the handlers.

The German study of the Veterinary University of Hannover, performed with 7 dogs on 10,388 salivary and tracheobronchial samples inactivated with betapropiolactone, concluded a sensitivity of 82.6% and a specificity of 96.3% [3]. The French study of the National Veterinary School of Alfort (Projet NOSAÏS), using axillary sweat considered as non-contaminating, obtained similar results with 8 dogs and 368 tests: 4 dogs were 100% effective, the other 4 were 83%, 84%, 90% and 94% effective [4]. Subsequent studies conducted in Lebanon and the United Arab Emirates found a sensitivity of 92-98%; some pre-symptomatic cases of Covid-19, negative in RT-PCR, were identified by olfactory detection a few days before the onset of symptoms and positive in RT-PCR [5]. Another French project (COVIDOG), supported by the Foundation of the University of Strasbourg and the University Hospitals of Strasbourg, uses cell cultures taken from Covid-19 patients to identify a specific odor with "odor sponges" (absorbent polymer tubes or surgical masks adapted to the capture of respiratory VOCs) allowing detection from groups (airport, train, various gatherings, etc.) or at the individual level [6].

Given the promising results of these various olfactory tests obtained with dogs trained in respect of animal welfare, the National Academy of Medicine and the Veterinary Academy of France recommend :

- to complete the scientific evaluation and development of this new test in order to implement it as soon as possible:
- to specify its analytical performance (sensitivity, specificity);
- to identify in the volatiloma the specific molecule(s) of Covid-19;
- to promote the creation of dedicated teams (staff, dogs);
- to secure the presentation of the samples to be analyzed, both for the dogs and for the staff;
- and to define the rules for the proper use of this type of test.

References

[1] Angle C et al. Canine detection of the volatilome: a review of implications for pathogen and disease detection. *Front Vet Sci.* 2016;3:1-7.
[2] Communiqué de l'Académie Nationale de Médecine « Covid-19 : dépister plus, dépister mieux », 3 août 2020.
[3] Jendrny M. et al. Scent dog identification of samples from COVID-19 patients – a pilot study. *BMC Infectious Diseases* (2020) 20:536 - https://doi.org/10.1186/s12879-020-05281-3.
[4] Grandjean D et al. Detection dogs as a help in the detection of COVID-19 Can the dog alert on COVID-19 positive persons by sniffing axillary sweat samples? Proof-of-concept study. *bioRxiv* preprint doi: https://doi.org/10.1101/2020.06.03.132134.
[5] Grandjean D, personal communication.
[6] Escalón S. Covid-19 : les chiens renifleurs à la rescousse ? Journal du CNRS du 19.06.2020.