

Camel prion disease: a possible emerging disease in dromedary camel populations?



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The identification of a new prion disease in dromedary camels in Algeria and Tunisia, called camel prion disease (CPD), brings back memories of the bovine spongiform encephalopathy (BSE) epidemic in the 1980s in the United Kingdom. Knowledge on prion diseases has improved since then but our method of coping with these diseases remains a threat and the potential transmission of these animal prion diseases to humans indicates that they can pose a significant public health risk.

Camel prion disease was identified in 2018 by Algerian researchers in the region of Ouargla, central Algeria, and found in 2019 in the neighbouring Tunisian region of Tataouine. It adds to the group of existing animal prion diseases, including scrapie in sheep and goats, chronic wasting disease (CWD) in cervids and BSE (mainly in bovines). The limited prevention and control tools for prion diseases makes their management challenging. Thus, the detection of a new prion disease in the dromedary population requires attention due to its potential impact on animal and public health. As of today, very limited epidemiological information is available to assess the prevalence, geographical distribution and dynamic of the transmission of the disease.

Based on the clinical signs suggesting prion disease, CPD seems to have occurred in 3.1% of the dromedaries brought to the abattoir in Ouargla. Pathognomonic neurodegeneration and disease-specific prion protein (PrP^{Sc}) were detected in brain tissue from three symptomatic animals (source: CDC article wwwnc.cdc.gov/eid/article/24/6/17-2007_article). In May 2019, the OIE received a report from Tunisia on a single case of a 12-year-old slaughtered dromedary camel showing neurological signs confirmed as CPD by the Istituto Superiore di Sanità (ISS) based in Italy.

Is camel prion disease transmissible in natural conditions?

The involvement of lymphoid tissue in prion replication, observed both in the Algeria and Tunisia cases, is suggestive of a peripheral pathogenesis, which is thought to be a prerequisite for prion shedding into the environment. As with other animal prion diseases, such as scrapie and CWD, in which lymphoid tissues are extensively involved and horizontal transmission occurs efficiently under natural conditions, the detection of prion proteins in lymph nodes is suggestive of the infectious nature of CPD and concurs to hypothesise the potential impact of CPD on animal health. No evidence is currently available with which to argue for the relevance of CPD for human health. However, no absolute species barrier exists in prion diseases and minimising the exposure of humans to prion-infected animal products is an essential aspect of public health protection. As for the relationship between CPD and other animal prion diseases, preliminary analyses suggest that CPD prions have a different molecular signature from scrapie and BSE.

Since the first description of CPD, the OIE promoted discussions on the impact of this new disease through the OIE Scientific Commission for Animal Diseases (Scientific Commission). The Scientific Commission consulted two OIE *ad hoc* Groups, one on BSE risk status evaluation of Members and the other on camelids, and analysed the information available from the Algeria and Tunisia cases to evaluate if CPD should be considered an 'emerging disease' based on the criteria listed in the *Terrestrial Animal Health Code*: 'a new occurrence in an animal of a disease, infection or infestation, causing a significant impact on animal or public health resulting from **a**) a change of a known pathogenic agent or its spread to a new geographic area or species, or **b**) a previously unrecognised pathogenic agent or disease diagnosed for the first time'. The OIE Scientific Commission noted that limited surveillance data were available on the prevalence of CPD and that the evidence was not sufficient to measure, at that time, the impact of the disease on animal or public health. Therefore, the Scientific Commission concluded that, with the current knowledge, CPD did not currently meet the criteria to be considered an emerging disease. Nonetheless, it was emphasised that CPD should be considered as a new disease not to be overlooked and called for the collection of further scientific evidence through research and surveillance in the affected countries and in countries with dromedary camel populations to measure the impact of the disease. As new scientific evidence becomes available, the OIE Scientific Commission will reassess whether this disease should be considered as an emerging disease.

The worldwide camel population is ~35 million head (FAO, 2019), 88% of which is found in Africa. The camel farming system is evolving rapidly, and these animals represent vital sources of meat, milk and transportation for millions of people living in the most arid regions of the world. This makes it necessary to assess the risk for animal and human health and to develop evidence-based policies to control and limit the spread of the disease in animals, and to minimise human exposure. As a first step, the awareness of Veterinary Services about CPD and its diagnostic capacity needs to be improved in all countries where dromedaries are part of the domestic livestock.

At the regional level, CPD was first discussed in the 18th Joint Permanent Committee of the Mediterranean Animal Health Network (REMESA) held in Cairo, Egypt, in June 2019 where an expert from ISS, Italy, shared the knowledge available on the new disease with the 15 REMESA Member Countries. The discussion highlighted the need to strengthen surveillance systems in order to collect

epidemiological data to inform the risk assessments. The results of these risk assessments will support the implementation of evidence-based policies to manage the risks in both animals and humans.



CPD was recently discussed at the 15th Conference of the OIE Regional Commission for the Middle East in November. During this conference, the CAMENET (Camel Middle East Network) launched a wide-ranging proposal for training, coordinated surveillance and research on CPD. In addition, the ERFAN (Enhancing Research for Africa Network), a platform aimed at enhancing scientific cooperation between Africa and Italy, during its 2nd ERFAN meeting for North Africa, presented a project on CPD with the objective of increasing CPD coordinated surveillance in North Africa.

The OIE, through its Reference Laboratories for prion diseases, and by involving the above scientific initiatives, is keeping a close watch on the evolution of the disease to gather scientific evidence and to allow a proper and more thorough assessment of the risk associated with this novel disease.

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