

## Middle East Respiratory Syndrome (MERS) Coronavirus: A New Challenge for Veterinarians?

The emergence of Middle East respiratory syndrome (MERS) in September 2012, a respiratory infection caused by MERS coronavirus (CoV), a betacoronavirus, is of concern for the global health community. Most reported cases occurred in the Middle East, specifically in Saudi Arabia and sporadically in Jordan, United Arab Emirates, and Qatar. A few imported cases have been recorded in Europe. MERS CoV has caused globally a total of 51 deaths out of 108 laboratory-confirmed human infections. This infection is likely of zoonotic origin and thus of relevance for the veterinary sector. Betacoronaviruses have their origin in bats, and many of them have bats as definitive hosts. This is the case for severe acute respiratory syndrome coronavirus (SARS-CoV) and some related bat coronaviruses recently found in Europe. MERS-CoV is comparable to SARS-CoV in several aspects. MERS-CoV is easily cultured in bat-derived cell lines, suggesting a similar origin. Recently, a virus was identified from a *Taphozous perforatus* bat (family Emballonuridae) from Saudi Arabia that showed 100% nucleotide identity with MERS-CoV in a conserved portion of the CoV genome. If this finding was not due to laboratory contamination, it would suggest that bats may be the definitive hosts. The likelihood of contact between people and bats is low, except for cave explorers and specific risk groups. SARS-CoV became transmitted to people through civets (carnivores that are bred for human consumption in Southeast Asia). How civets got the virus from bats is unknown. It is presently not known if there is an intermediate host for MERS equivalent to the civets for SARS. However, a very recent study has shown that 100% of 50 camel sera from Oman had specific antibodies against MERS-CoV spike protein. Moreover, 15 of 105 (14%) camels from western Africa also showed antibodies against the virus. On the other hand, the same study indicated no presence of antibodies in a group of 194 analyzed cattle, sheep, goats, llamas, and alpacas. Importantly, the serological tests used were specific and did not cross-react with other coronaviruses. Therefore, based on the apparent wide-spread nature of the infection in the analyzed Middle East camels, together with the usual close contact of these animals with humans in that geographic area (food source, markets, and races), it has been suggested that camels might play a role as a potential intermediate host for MERS. Although not surprising, fairly limited epidemiological investigations indicated that some patients with MERS had contact with camels, and probably many had consumed camel meat. This is the state of the art in September 1, 2013. Still, to the best of our knowledge, MERS-CoV has not been detected in camels, goats, and other animal species, possibly with the exception of bats in Middle East countries. Moreover, so far, no evidence of disease linked to MERS-CoV has been found in animal species. In such an emerging scenario, scientists from several institutions are struggling to collect more material, particularly from Middle East countries with reported human cases, but also from other regions with overlap between bats and camels. Although the zoonotic links are still unclear, we expect MERS to become relevant for the veterinary community (including pathologists) and an interesting case study regarding disease emergence at the wildlife-livestock-human interface.



