TAFS – Update on SARS-CoV-2 and Minks

13 November 2020

Unique SARS-CoV-2 variant found in minks and humans in Denmark. What does it mean?

In September 2020, 12 human cases with a **unique variant** of SARS-CoV-2 associated with mink were identified in Denmark (SARS-Cov-2 mink, 2020). Preliminary findings indicate that this particular mink-associated variant has moderately **decreased sensitivity to neutralizing antibodies**. Four mutations have occurred in parts of the genome that code for the spike protein of the virus, which is a target for vaccines and treatments under development. Although the implications of this new variant are under investigation, the concern is that the current vaccines under development might **not be as effective** against this new variant. There is therefore the potential that this new variant might spread further, and that the current efforts with gaining immunity are hampered.

While it is suspected that the first cases of SARS-CoV-2 in mink were a result of human-to-animal transmission, it has been shown that most of the cases of human infection associated with mink farms has been a result of animal-to-human transmission with minks transmitting the virus back to humans (ProMed, Nov 10). Subsequent human-to-human transmission has been reported, also known as community transmission, highlighting the danger that mink pose to humans as a reservoir for the virus. Aside from the initial spillover event that perhaps occurred in China that initiated the pandemic, cases of mink-to-human transmission of SARS-CoV-2 are the only reported cases of animal-to-human transmission at this time. However, it remains a concern that other susceptible animal species can act as reservoirs of the virus and infect humans, such as pet dogs and cats.

Current evidence indicates that these variants are able to circulate rapidly in mink farms and the human communities close to the farms, however, they **do not appear to be more transmissible** than other circulating SARS-CoV-2 variants (ECDC, 2020). People infected with mink-related variants **do not appear to have more severe clinical symptoms** than those infected with non-mink-related variants (ECDC, 2020).

The spread of the cluster 5 variants between mink farms is suspected to have taken place through various routes, primarily through **human contamination** but also through **contamination of the manure and feed of the infected minks** (ProMed, August 17). Animals, such as **stray cats, rats and birds,** may have spread the virus between farms through the displacement of the mink's feed or manure (ProMed, August 17). In May, the Netherlands reported that 3 farm cats at a contaminated mink farm tested serologically positive (ProMed, May 25).

Cross-border spread has occurred, with the cluster 5 variant being identified retrospectively in the Netherlands (ProMed, Nov 9). The mink in the Netherlands were culled, and humans did not get infected with the variant there. It is unknown how the variant may have spread from the Netherlands to Denmark or vice-versa. It is expected that the cluster 5 variant will spread across borders through *human movements* just like other SARS-CoV-2 variants. However, cross-border spread through *animals and animal products* appears very low (ECDC, 2020).

What is Denmark doing to contain the new mink SARS-CoV-2 variant?

Because of the potential far-reaching consequences of this new variant, Danish authorities have announced the following public health actions;

- Culling of all 17 million farmed mink in Denmark, the largest producer of mink in the world;

- Enhancing surveillance of the local population to detect all COVID-19 cases, including through population-wide mass PCR testing for the region of North Jutland;
- Expanding the percentage of sequencing of human and mink SARS-CoV-2 viruses in Denmark;
- Rapid sharing of the full genome sequences of the mink-variant SARS-CoV-2; and
- Introducing new movement restrictions and other public health measures to affected areas in North Jutland to reduce further transmission, including movement restrictions between municipalities.

History of SARS-CoV-2 in Minks

To date, 6 countries, namely Denmark, the Netherlands, Italy, Spain, Sweden, and the United States of America (U.S.) have reported SARS-CoV-2 in farmed minks (SARS-Cov-2 mink, 2020). Each country has responded to the outbreaks on mink farms differently, mostly based on whether or not animal-to-human transmission is suspected. There is evidence of animal-to-human transmission in the Netherlands and in Denmark (Oude Munnink, 2020, Maron, 2020). It is unknown if animal-to-human transmission occurred in Spain. The Netherlands, Denmark and Spain have taken more proactive approaches to culling infected farms, with Denmark going so far as to cull its entire farmed mink population. The U.S., Sweden, and Italy have taken more conservative approaches, as evidence of animal-to-human transmission there has not been shown.

The first reported cases of SARS-CoV-2 in minks and mink farm workers occurred in April 2020 in association with two farms in **the Netherlands**. The Dutch government immediately put important protective measures in place, including mandatory protective equipment for mink farm workers, a ban on visitors, and mandatory reporting of symptomatic or increase in mortality in mink. Screening in May revealed that 68 Dutch mink farms were infected and were subsequently culled. In June, several minks and one employee test positive for the first time in **Denmark,** most likely as a result of human-to-animal transmission. Denmark initiated mandatory reporting and screening of mink farms and enforced hygiene measures. In July, a mink farm worker in **Spain** tests positive, after which it is found that 80% of the tested mink on the farm are also positive. Spain ordered the 93,000 minks on the farm to be culled. In August, minks at 2 farms in Utah in the **U.S.** test positive. In October, several minks and people on the farms test positive in **Sweden**. At this time, 140 farms in Denmark are found to be infected. At the end of October, **Italy** revealed that samples from mink in August tested positive. On 5 November, Denmark reports 12 human cases caused by the mink-associated variant strain (cluster 5 strain). As of 10 November, SARS-CoV-2 continues to spread in mink farms in Sweden and in the U.S., and the cluster 5 strain is detected retroactively in the Netherlands.

There is still a lot to learn about SARS-CoV-2

When a virus spreads in a large population of susceptible hosts that are in close proximity, the likelihood for mutations increases. Such is the case of farmed minks, which are in addition highly susceptible to the SARS-CoV-2 strains circulating in the human population.

It is important to investigate changes in the SARS-CoV-2 genome found in mink and other species through sequencing to gain a better understanding of the evolution of the virus and the potential threat to vaccine and treatment development. Based on what we know so far about SARS-CoV-2 variants with mutations of the spike protein, it is especially important that humans infected with these variants follow strict quarantine procedures in order to prevent further spread nationally and internationally. However, given what we know about human behavior, it should be expected that the cluster 5 variant will continue to spread.

As ever, it is important for such scenarios to be scientifically studied in order to make appropriate decisions affecting public health. The gathering of evidence of how COVID-19 behaves among all species continues.

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