Novel Retrovirus associated with Ethmoid Tumor in Moose (Alces alces)

Deep sequencing analysis of ethmoid tumors in Swedish and Norwegian moose with "Hole-in-the-head disease" identified a novel retrovirus related to viruses that induce tumors in the nasal epithelium of sheep and goats.

Introduction
Ethmoid tumor in moose (Alces alces) always originate in the nasal mucosa adjacent to the ethmoid bone, causing a typical midline hole-in-the-head lesion in the frontal bone as the tumor erodes bone tissue of the upper nasal cavity. Penetration of the ethmoid bone is followed by clinical CNS symptoms when expanding tumor masses compress and occasionally also infiltrate the frontal aspects of the brain. The disease has been noted as sporadic cases since at least a century, but only in Sweden and Norway. The tumors are predominantly adenocarcinomas, but have occasionally been classified as carcinosarcomas or sarcomas at histopathology. Viral etiology as a cause for this tumor type has been suggested in earlier studies, due to similarities with nasal tumors of sheep and goats, but a causative virus has previously not been identified.

Material & methods
Illumina MiSeq high-throughput sequencing technology was used to search for virus in archived frozen tumor tissue samples from 24 necropsied moose cases from Sweden and Norway.

Results & Discussion
Nucleotide sequences related to enzootic nasal tumor virus of goats, ovine enzootic nasal tumor virus, or Jaagsiekte sheep retrovirus were identified in all samples. These results suggest that a virus, tentatively named Moose ethmoid tumor retrovirus, is associated with the ethmoid tumors of moose. If this virus causes the tumors leading to "Moose hole-in-the-head disease", it seems to be endemic in the moose population of the Scandinavian peninsula, as this specific type of tumor has not been reported in moose from any other countries.

Further characterization of the tumors and immunohistochemical studies using retroviral antibodies are to be done, and attempts to isolate virus are ongoing.

References