

Type A influenza viruses can infect both mammals including humans, pigs, horses, cats, dogs, ferrets, and sea mammals as well as domestic and wild birds. Although influenza A viruses shows host range restrictions, interspecies transmission have been documented at many occasions. Swine have been proposed as an intermediate host for influenza viruses since they are susceptible to both avian and human influenza viruses and genetic reassortment up on co-infection with influenza viruses of different origins can occur in swine. Herein, we were able to isolate novel H1N2 reassortant influenza viruses from pigs in Ohio with a human-like swine HA and NA genes, swine triple reassortant internal genes, and pandemic H1N1 lineage NP and M genes. The reassortant H1N2 viruses were antigenically different from the classical and the contemporary TR H1N1 swine influenza viruses (SIVs). The reassortments of pandemic H1N1 with circulating SIVs points out the potential of either change of the pathogenicity of the newly generated virus and/or acquiring the ability to transmit from swine to other species including human. In the U.S. turkeys are usually raised in close proximities to the swine population. Thus, frequent transmission of SIVs from swine to turkeys causing significant economic losses was reported. Given the fact of high susceptibility of turkeys to influenza viruses of different origins, turkeys have been suspected as an intermediate host for influenza viruses that may enhance the virus's adaptability to domestic birds. For these reasons, we conducted a study to characterize influenza A viruses strains of different origins including the recently isolated swine viruses in turkeys. Seasonal human and pandemic H1N1 influenza viruses were also included. The study showed that all tested viruses were able to infect turkeys as indicated at least by a detectable immune response. Also, layer turkeys seem to be more affected by SIVs. Moreover, variations between SIVs replication efficiencies were observed especially in the reproductive tract of layer turkeys. To elucidate the differences that we observed among SIVs in layer turkeys, we utilized virus histochemistry technique to measure the attachment patterns of selected influenza strains (including avian, swine, and human strains) to respiratory and reproductive tissues. All the tested influenza viruses showed attachment to the upper respiratory tract. In the oviduct, only the avian and swine viruses bind to the epithelium of different oviduct compartments, especially the isthmus and uterus. The results correlated with the in vivo replication characteristics of the tested influenza strains indicating that virus histochemistry can be a useful surrogate to study the influenza viruses host tropism. We also studied the effect of alteration of the host immune system on the transmission and adaptation of recently isolated SIVs in turkeys. The study revealed the stress induced immunosuppression can enhance the transmission and adaptation of swine influenza viruses in turkeys through enhancement of virus replication and prolonged virus shedding, and possibly by decreasing the required infectious dose to initiate the infection.