

***Toxoplasma gondii* Associated with Venison**

November

Itasca County

During February through April 2018, three toxoplasmosis cases with the same last name were identified through routine surveillance at the Minnesota Department of Health (MDH). All three cases were members of an extended family that hunted deer together in early November 2017. An outbreak investigation was initiated.

The MDH Zoonotic Diseases Unit obtained a list of family members who were at a family cabin for the deer hunting trip during November 3-7, 2017. MDH attempted to interview all family members using a standard interview form to obtain information on demographics, illness history, deer killed and consumed, and hunting history. All family members were asked if they wished to participate in a voluntary blood draw to test for *Toxoplasma* antibodies by serology, and submit any of that weekend's venison still remaining. Testing of serum and venison was conducted at the Palo Alto Medical Foundation (PAMF). All serum samples were tested for *Toxoplasma* by IgG (dye test) and IgM (ELISA) antibodies. If either of these tests were positive, additional testing of differential Agglutination (AC/HS), IgG avidity, IgA ELISA and IgE ELISA were performed. Venison was tested for *Toxoplasma* by polymerase chain reaction at the PAMF.

A confirmed case was defined as a person who attended the hunting trip, reported three or more of the following symptoms - fever, fatigue, sweats, lymphadenopathy or myalgia, with onset during November 13-28, 2017 and either had ophthalmologist-diagnosed acquired toxoplasmosis or had serologic test results consistent with recently acquired *Toxoplasma* infection. A probable case met the symptom criteria but not the ophthalmology or serology criteria.

Of the 15 persons who were at the cabin during November 3-7, 14 consented to be interviewed and 11 provided serum for testing. Four (29%) of 14 people interviewed met the case definition, including three confirmed cases and one probable case. The ages of the cases were 53, 57, 58, and 58 years; all were male. Dates of illness onset were November 17 and 18. All of the cases reported fever, sweats, fatigue, and weight loss. Three of four cases reported myalgia. Duration of fever was 5, 6, 14 and 21 days. Duration of illness was 6, 14, 21 and 180 days. One of the cases had previously unknown diabetes that was diagnosed on November 22, 2017. All four cases visited a health care provider for their illness. The provider tested each case for *Toxoplasma* IgG and IgM antibodies and diagnosed three of them with toxoplasmosis prior to cases voluntarily submitting serum to PAMF. One case was hospitalized for 5 days for sharp pleuritic chest pain, pneumonia and pulmonary embolism, 2 months prior to being diagnosed by an ophthalmologist with chorioretinitis and acute toxoplasmosis and starting anti-*Toxoplasma* therapy.

Four of seven (57%) persons who stayed at the cabin for 4 days became ill, compared to zero of people who stayed for less time (2 days) ($p = 0.07$). Four of ten (40%) people who field dressed deer met the case definition, versus zero of four persons who did not field dress deer ($p = 0.25$). Four of nine (44%) persons who consumed venison became ill, compared to none of five persons who did not consume venison ($p = 0.22$). Four of the seven (57%) persons exposed to potentially raw or undercooked venison

acquired toxoplasmosis, compared to none of seven persons who did not report eating raw or undercooked venison ($p = 0.07$).

Eleven family members provided serum samples from May 12 through June 5, 2018 (189 to 213 days after potential exposure) to the MDH Public Health Laboratory to forward to PAMF for *Toxoplasma* antibody testing. Serum from the four cases sent to PAMF were positive for *Toxoplasma* infection and underwent further testing to determine a time frame for when infection was most likely acquired. PAMF's findings indicated that two of the four cases were likely exposed within the timeframe of November 3-5, 2017. The other two cases' serology estimated that they could have been exposed to *Toxoplasma* greater than 1 year prior to serum collection date. The ocular case was one of the cases with the past exposure interpretation and was started on anti-*Toxoplasma* medication 4 months prior to testing, which may have influenced results.

Family members reported that approximately four deer were killed. Venison was processed and the fresh inside loins and back strap of one or two deer were fried and consumed on Sunday November 5. Five family members provided seven packages of frozen venison for PAMF to test by PCR; four of the packages were venison steak, one was venison roast, one was ground venison, and one was venison chops. There was no way of knowing which deer were represented in each package or if the deer from which the venison was consumed during the exposure weekend was represented in any of the packages. One package of steaks was positive for *Toxoplasma*.

This was an outbreak of toxoplasmosis associated with eating undercooked fresh venison at a privately owned cabin. MDH recommended that hunters freeze venison for 4 days at -4° F prior to cooking, or cook their meat to 160° F before eating.