



Ontario

Raccoon rabies in eastern Ontario

On July 14, 1999, the Rabies Laboratory at the Animal Diseases Research Institute (ADRI) Nepean of the Canadian Food Inspection Agency (CFIA), diagnosed a raccoon as infected with the raccoon strain of rabies virus. The raccoon had been found in a dog pen on the previous day in Maynard, a village northwest of Prescott, Ontario, on the St. Lawrence River. A second case of raccoon rabies was identified on July 26 in a location 15 km north of Brockville, 15 km west of the index case. **These are the first confirmed cases of raccoon rabies virus infection in Canada. What follows is a description of the current diagnostic procedures for rabies in Canada, a review of programs that had been implemented to prevent the incursion of raccoon strain of rabies into Ontario, and the control measures that are in progress at the time of writing.**

All submissions from animals suspected of having rabies are processed by the rabies laboratories of the CFIA; ADRI Nepean for the eastern regions, ADRI Lethbridge for the western regions. Samples are initially screened by fluorescent antibody test (FAT). The FAT involves microscopic examination of brain smears stained with a fluorescein-labelled polyclonal antibody that reacts with all common strains of rabies virus. The specimens that are positive on the FAT are further tested to identify the strain of rabies virus by using monoclonal antibodies (Mabs). For this purpose, a panel of 15 selected anti-N (nucleoprotein) and anti-P (phosphoprotein) Mabs is applied to freshly prepared brain smears. If the rabies case is a rabid bat or if the Mab reaction pattern on the brain smears is unusual, the virus is grown in neuroblastoma cell cultures. Infected tissue culture cells are then stained with more than 400 different Mabs. The Mabs produced at ADRI Nepean include antibodies against N-, G- (glyco-), P-, and M- (matrix-) proteins of different variants of rabies virus and rabies-related lyssaviruses. Rabies viruses are classified according to their reaction pattern with anti-N and anti-P Mabs. Selected isolates are genetically characterized by sequencing parts of the RNA genome (mostly the N, P, and G gene). These nucleic acid sequences are used for phylogenetic analysis.

At present, 12 antigenic variants or strains of rabies virus are recognized in Canada. A fox-adapted strain (sometimes called Arctic strain) is found across the Arctic and in southern Ontario, with incursions at times into southern Quebec and northern New York State. A skunk-adapted virus variant is found in the Prairie Provinces. Seven distinct Mab reaction patterns are seen with isolates originating from big brown bats (*Eptesicus fuscus*), one is seen with isolates from silver-haired bats (*Lasiurus noctivagans*), one with bats of the genus *Lasiurus* (hoary and red bats), and at least one strain (poorly defined yet) is associated with bats of the genus *Myotis* (little brown bats and others). These antigenic virus variants correspond to distinct branches (clades) in the phylogenetic analysis of nucleotide sequences. The incursion of raccoon rabies has added a distinct strain to the array of variants of rabies virus in Canada. All of these variants are capable of infecting a large

variety of different mammals, but they are adapted for prolonged circulation in populations of only one or a few species.

The raccoon strain of rabies virus emerged in Florida in the 1940s. It spread from there to neighboring states, was unintentionally introduced in the late 1970s into the Mid-Atlantic region, and is now spreading through the Appalachian range and along the Atlantic coast. In New York State, the raccoon rabies strain was found in the early 1990s. At present, it is observed in almost every county in New York State, notably those close to the St. Lawrence River (Jefferson and St. Lawrence counties). The virus has also been detected in Vermont, 20 km from the Quebec border, half-way through the state of New Hampshire, and three quarters of the way up Maine towards New Brunswick. Raccoon rabies virus has also been isolated in Ohio and is moving west in that state.

The Ontario Ministry of Natural Resources (OMNR) has been conducting trap-vaccinate (with an inactivated vaccine)-release programs for several years at the major border crossings in the St. Lawrence and Niagara areas to build defensive zones of immunized resident raccoons in an attempt to minimize the spread of an outbreak. The cases we are reporting occurred outside the vaccinated zone.

Since 1993, the Raccoon Rabies Contingency Plan has been developed as a joint effort of the OMNR, the Ontario Ministries of Health (OMH) and Agriculture, Food and Rural Affairs (OMAFRA), the CFIA, regional governments, local police services, humane societies, and other agencies. Under this plan, the initial response to these first 2 cases of raccoon strain rabies was the *point control plan* initiated by the OMNR. Within a 5 km radius of each of the raccoon strain-positive rabid raccoons (point control area), all raccoons and skunks are being humanely captured, destroyed, and tested in the CFIA laboratory for the presence and strain identification of rabies virus. In a wider 5 km ring around the point control area, the OMNR traps, vaccinates, and releases all raccoons and skunks that have been humanely captured.

In Ontario, the OMNR monitors and responds to all outbreaks of wildlife rabies. The Programs and Operations group of the CFIA investigates all pets and livestock that are either suspected of having rabies, or have contacted animals that are suspected of having or confirmed as having rabies. Case investigation may include submitting tissues from or quarantining suspect animals and their contacts. The OMH is involved in all human contact cases.

The current rabies vaccines protect companion and domestic animals against all the strains of rabies virus found in North America. The press releases and media consultations are stressing the need to the public to "admire wildlife from a distance" and to make sure that their pet's rabies vaccination is up to date.

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