Tissue distribution of disease-related prion protein deposition and infectivity for atypical scrapie

Maes o ddiddordeb ymchwil: Foodborne pathogens
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Background

Very little is known about atypical scrapie affected sheep in terms of distribution of infectivity within the body tissues. There are regulations in place which control the removal of specified risk material (SRM) from lambs and sheep destined for the human food chain but it is uncertain whether this will protect consumers from the unknown risks of atypical scrapie.

Research Approach

Tissue samples from sheep orally infected with atypical scrapie were collected. These include brain, spleen, kidney, liver and various muscle tissues. Tissues were processed using a range of anti-PrP antibodies including P4 which reveals the prion protein from atypical scrapie on Western blots and BG4 which has produced positive staining in our atypical scrapie case cerebellum with immunohistochemistry.

Results

Sheep were infected by the oral route with atypical scrapie and groups of the animals were killed at 6 months, 12 months and 36 months.

Tissue samples collected were: brain, spleen, kidney, liver, jejunum, semitendinous muscle (m), semimembranosus m.; longissimus m., distal ileum, prescapular lymph node (ln), prefemoral ln, mesenteric ln.
No disease was seen in the sheep and no PrPSc was detected by biochemical methods or microscopy. However these are not the most sensitive methods of infection detection. The most sensitive way to detect infection is by bioassay in mice and in this project four tissues were chosen from the sheep in the 36 month group and tested in mice. The tissues selected were:

(a) brain: the primary target of all scrapie-like diseases and chosen as a control
(b) spleen: the is one of the lymphoid tissues which are an early target of classical scrapie and might be expected to become infected with atypical scrapie
(c) liver and muscle: both chosen as representatives of sheep tissues which are routinely consumed by humans.

Mice were challenged with samples from these tissues and observed for lifespan. No disease resulted however the mouse tissues were examined for signs of PrPSc protein using microscopy and signs of the protein were found in brains of all mice. There is one potential problem with this finding in that the researchers suspect the result may be related to a property of the mouse brain

itself rather than the product of an infection. This will be further analysed.

These results suggest that if any infectivity is present in atypical scrapie infected sheep, it is at a very low level.

Research report

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