PRION DISEASE UPDATE 2012 (03)

A ProMED-mail post

[Due to the decline in frequency of human cases of variant Creutzfeldt-Jakob disease (vCJD) the UK, French, and US surveillance organisations are no longer providing routine monthly reports. From now on the ProMED-mail Prion Disease Updates will provide only regular selections of information relevant to human vCJD and similar prion-related diseases relevant to the human situation. - Mod.CP]

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[1] Ozone as a decontaminant
[3] CJD variants
[5] UK BSE case control study

[1] Ozone as a decontaminant
Date: 3 Mar 2012
Source: Medical News [edited]

Ozone-treated water can eradicate prions in the brain of infected animals

A University of Alberta research team has discovered that technology commonly used to decontaminate food industry equipment can also rid meat processing plants of lethal microbial material responsible for the human version of the ailment mad cow disease [that is, variant Creutzfeldt-Jacob disease].

University of Alberta microbiology professors Mike Belosevic and Norm Neumann and engineering professor Mohamed Gamal El-Din demonstrated that infectious proteins found in the brain matter of cattle can be eradicated from water treated with ozone. The discovery could have applications in decontaminating wastewater in settings such as slaughterhouse effluents where infected neural material known as prions may be present. Cases of human transmission of infectious prions through surgical equipment have also been documented. The ozone decontamination procedure can potentially be used to sterilize instruments used for neurosurgery, and prevent the transfer of infectious prions during surgical procedures.

Prions have been identified as source of mad cow and chronic wasting disease in animals. The human variants or these conditions are Creutzfeldt-Jakob disease and Alzheimer's disease. Prions are found in the brain and spinal cord tissue of infected animals and are a grave health risk in human and animal settings. Prions are able to destroy and can still be infectious after being incinerated at heats of 850 deg C [1562 deg F]. In the wild, soil contaminated by a carcass of a deer that died of chronic wasting disease can remain a source of infection for many years.

The University of Alberta research team's technique of using water treated with ozone to destroy prions is an improvement on current prion decontamination methods.

[The heading of this report is misleading. Ozone is being used as a decontaminant of fluids and solid waste, and cannot destroy prions in the brains of living animals. - Mod.CP]

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.communicated by: ProMED-mail correspondent Susan Baekeland
Variant Creutzfeldt-Jakob disease -- fact sheet number 180

Key facts
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-- Variant Creutzfeldt-Jakob disease (vCJD) is a rare and fatal human neurodegenerative condition.
-- The consumption of food of bovine origin contaminated with the agent of Bovine Spongiform Encephalopathy (BSE), a disease of cattle, has been strongly linked to the occurrence of vCJD in humans.
-- 175 cases of vCJD were reported in the United Kingdom of Great Britain and Northern Ireland (United Kingdom), and 49 cases in other countries from October 1996 to March 2011.
-- Following the successful containment of the BSE epidemic in cattle, the number of cases of vCJD in the United Kingdom has declined since 2000.

Variant Creutzfeldt-Jakob disease (vCJD) is a rare and fatal human neurodegenerative condition which is classified as a transmissible spongiform encephalopathy (TSE) because of its ability to be transmitted and the characteristic spongy degeneration of the brain that it causes.

vCJD was 1st described in the United Kingdom in March 1996 and has been linked with exposure to a TSE of cattle called bovine spongiform encephalopathy (BSE), also known as classical BSE [The term "classical BSE" has been introduced to differentiate the disease from atypical BSE cases, which occur rarely in the cattle population], which was 1st reported in the United Kingdom in 1986.

Total cases
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From October 1996 to March 2011, 175 [now 176 as of 4 Jan 2012 - Mod.CP] cases of vCJD have been reported in the United Kingdom, 25 in France, 5 in Spain, 4 in Ireland, 3 each in the Netherlands and the United States of America (USA), 2 each in Canada, Italy, and Portugal, and one each in Japan, Saudi Arabia, and Taiwan. The number of cases of vCJD in the United Kingdom peaked in 2000 with 28 deaths. It has since declined to about 2 diagnosed cases and 2 deaths per year in 2008.

Epidemiology
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Before the identification of vCJD, Creutzfeldt-Jakob disease (CJD), the most common of the known human TSEs, was thought to exist in only 3 forms:
-- sporadic CJD, which occurs throughout the world at the rate of about one per million people, and accounts for about 85 per cent of CJD cases;
-- familial CJD, which is associated with a gene mutation and makes up 5â’15 per cent of CJD cases; and
-- iatrogenic CJD, which results from accidental transmission via contaminated surgical equipment or as a result of corneal or meningeal (dura mater) transplants or the administration of human-derived pituitary growth hormones; this accounts for less than 5 per cent of CJD cases.

In contrast to the traditional forms of CJD, vCJD has affected younger patients (median age at death of 28 years, as opposed to 68 years) and has a relatively longer duration of illness (median of 14 months as opposed to 4.5 months).

The 1st person to develop symptoms of what turned out to be vCJD became ill in 1994. Most people who have developed vCJD lived in the United Kingdom. Some cases that were diagnosed in countries other than the United Kingdom occurred in people who were probably exposed to the BSE while residing in the United Kingdom.
As of early May 2011, the CJD surveillance unit for the United Kingdom reported 172 primary cases of vCJD, and 3 secondary cases of vCJD related to blood transfusion. Among primary cases, there are four additional cases in the United Kingdom and one in Canada where vCJD is strongly suspected, but the diagnosis has not yet been definitively confirmed by postmortem analysis.

Clinical features
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Early in the illness, patients usually experience psychiatric or sensory symptoms, which most commonly take the form of depression, apathy or anxiety, and occasionally (in a 3rd of the cases) unusual persistent and painful sensory symptoms. Neurological signs, including unsteadiness, difficulty walking and involuntary movements, develop as the illness progresses and, by the time of death, patients become completely immobile and mute.

Diagnosis
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-- The clinical presentation, progressive nature of the disease and failure to find any other diagnosis are characteristic of vCJD.
-- There are no completely reliable tests to use before the onset of clinical symptoms. However, magnetic resonance scans and tonsillar biopsy are useful diagnostic tests.
-- The brainwave pattern observed during an electroencephalogram is abnormal in most vCJD patients.
-- Currently, the diagnosis of vCJD can only be confirmed following pathological examination of the brain postmortem. Characteristically, multiple microscopic and abnormal aggregates encircled by holes are seen in the brain tissue, resulting in a daisy-like appearance described by the term “florid plaques”.

Probable cause
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The nature of the vCJD agent is being investigated and is still a matter of debate. One prevalent theory is that the agent is composed largely, if not entirely, of a self-replicating misfolded protein, referred to as a prion.

There is strong scientific evidence that vCJD is linked with exposure to a TSE of cattle called BSE. The link between vCJD and BSE was first hypothesized because of the association of these two TSEs in time and place. In addition, laboratory evidence indicates that vCJD is linked causally with BSE.

Intensive surveillance in European countries has confirmed the high incidence of vCJD in the United Kingdom, the country with the largest potential exposure to BSE. Several cases in other countries were likely exposed to the BSE agent while residing in the United Kingdom.

The most likely cause of vCJD is exposure to the BSE agent through consumption of food from bovine origin most plausibly contaminated by infected bovine brain or other central nervous system tissue.

Only four cases of vCJD infection have been associated with blood transfusion: three of these cases developed symptoms of vCJD several years after transfusion, and one died from unrelated causes before developing symptoms of vCJD, but was shown to be infected with vCJD.

Measures taken to protect public health
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-- Due to the strong evidence of a link between vCJD and BSE, the UK government made BSE a notifiable disease in 1988. Since 1994, the European Union has progressively implemented control measures that have contained BSE. The main measures are detailed in the information sheet on Bovine Spongiform Encephalopathy.
-- Since 1999, the United Kingdom has no longer sourced plasma from its inhabitants, and as a further precautionary measure against the occurrence of vCJD, has instituted leukocyte depletion (removal of white blood cells) from blood transfusions. Some countries have prohibited donations of blood from persons who have resided in countries with higher risk of BSE.
WHO response
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WHO has worked on:
-- convening scientific consultations on issues related to animal and human TSEs (these meetings
have made recommendations aimed at protecting human and animal health);
-- assisting with global surveillance of CJD and its variants, by holding training courses worldwide,
particularly in developing countries, to help countries establish national surveillance of CJD and its
variants;
-- convening the Technical Consultation on BSE: Public Health, Animal Health and Trade, publishing
the WHO manual for surveillance of human transmissible spongiform encephalopathies, including
variant Creutzfeldt-Jakob disease.

WHO recommendations
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To protect human health, WHO has several recommendations.
-- No tissue that is likely to contain the BSE agent, nor part or product of any animal which has shown
signs of a TSE should enter the (human or animal) food chain. All countries should ban the use of
ruminant tissues in ruminant feed.
-- The pharmaceutical industry should avoid the use of bovine materials and materials from other
animal species in which TSEs naturally occur. If their use is absolutely necessary, these materials
should be obtained from countries which have a surveillance system for BSE in place and which
reports zero cases of BSE.
-- The Guidelines on tissue infectivity distribution in transmissible spongiform encephalopathies in
2006 provide information and assist national regulatory authorities in conducting risk assessments of
vCJD transmission.

In 2010, WHO updated the Tables on tissue infectivity distribution in transmissible spongiform
encephalopathies. The Tables reflect the current status of knowledge about infectivity in body tissues,
secretions, and excretions of humans and animals, and thus provide information about potential
transmission of vCJD through human blood and blood products, as well as through medicinal products
prepared with animal-derived materials.

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[3] CJD variants
Date: 28 Feb 2012
Source: Reviews in Medical Virology, Article 1st published online: 28 Feb 2012
DOI: 10.1002/rmv.725

Title: The contribution of different prion protein types and host polymorphisms to clinicopathological
variations in Creutzfeldt-Jakob disease

Summary
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Creutzfeldt-Jakob disease (CJD) is a fatal neurodegenerative disease that primarily affects the
central nervous system. In this respect, it can be considered alongside the more frequently occurring
neurodegenerative diseases, such as Alzheimer’s disease.
Creutzfeldt-Jakob disease is perhaps the paradigmatic protein misfolding disorder, so comparisons
between the mechanisms involved in Creutzfeldt-Jakob disease and other neurodegenerative
diseases associated with protein misfolding (such as the tauopathies and
synucleinopathies) may also be informative. Like many of these diseases, Creutzfeldt-Jakob
disease occurs sporadically or can, more rarely, be associated with mutations. However,
Creutzfeldt-Jakob disease can also be acquired and is experimentally transmissible.
These properties have had profound public health implications and made the disease of interest to virologists, in addition to those interested in protein misfolding disorders and neurodegeneration. The possible causes for the pronounced phenotypic variation among different forms of Creutzfeldt-Jakob disease are beginning to become understood, and these appear to depend in large measure on the genetics of the host (specifically the sequence of the prion protein gene, PRNP) and the epigenetic aspects of the agent (thought to be a misfolded and aggregated form of the PRNP gene product, termed a prion). This review will examine whether this model in its present form has sufficient complexity and subtlety to account for the clinicopathological variation evident in Creutzfeldt-Jakob disease and will outline the ways in which a more complete and informative molecular definition of human prions are currently being sought.

[byline: Mark W Head, James W Ironside]

[This review deals with the causes of the pronounced phenotypic variation among different forms of Creutzfeldt-Jakob disease and their dependence on the genetics of the host organism. - Mod.CP]

[4] Untested cow enters UK food supply
Date: Wed 7 Mar 2012
Source: Food Standards Agency [edited]
<http://www.food.gov.uk/news/newsarchive/2012/mar/jarrettcow>

Untested cow enters the food supply
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The Agency has been notified that meat from a cow that did not have the required BSE test has entered the food supply. The 62 month old cow had been slaughtered on a farm for welfare reasons. A negative BSE test result is mandatory for cattle intended for human consumption if slaughtered outside an authorised abattoir at over 48 months of age.

The carcass was sent to Alec Jarrett Ltd abattoir in Oldland Common, Bristol, on 7 Dec 2011. The error was discovered on 20 Feb 2012 in the course of routine official checks of cattle deaths and BSE test data. However, by the time the failure was discovered, the carcass had left the premises. Subsequent checks indicate that all the meat from the carcass is no longer traceable and is likely to have been eaten.

It is unlikely that the cow was infected with BSE and, as specified risk material (SRM) was removed, any risk to human health is extremely low. SRM is those parts of the animal most likely to contain BSE infectivity.

[Hopefully the will be no deleterious outcome of this unfortunate event. - Mod.CP]

[5] BSE/BARB case-control studies
Date 18 Jan 2012
Source: Veterinary Record doi:10.1136/vr.100097
<http://veterinaryrecord.bmj.com/content/early/2012/02/01/vr.100097.abstract>

Case-control study of cases of bovine spongiform encephalopathy born after 31 Jul 1996 (BARB cases) in Great Britain. By: A Ortiz-Pelaez, et al.
This paper reports the results of a case-control study of the bovine spongiform encephalopathy (BSE) cases born in Great Britain after the statutory reinforcement of the BARB ("born after the reinforced ban") ban on the feeding of mammalian-derived meat and bone meal on 31 Jul 1996.

A total of 499 suspect clinical cases of BSE, born after 31 Jul 1996, and reported negative by 31 Jul 1996 and were compared with the set of 164 confirmed Great BARB cases in Great Britain detected by both passive and active surveillance. Animal-level risk factors (age and type of feed offered) and herd-level risk factors (herd size and type, number of prereinforced feed ban BSE cases born on the holding, the presence of other domestic species and waste management) were obtained for the analysis.

BARB cases were 2.56 times (95 per cent CI 1.29 to 5.07) more likely to be exposed to homemix or a combination of homemix and proprietary feeds were 0.59 times (95 per cent CI 0.50 to 0.69) as less likely to be exposed to the unit increases in the number of prereinforced feed ban BSE cases diagnosed on the natal holding. A supplementary spatial analysis of these cases revealed 3 areas of excess BARB density: Northwest and Southwest of Wales and Northeast of Scotland.


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[see also:
Prion disease update 2012 (02) 20120216.1043716 Prion Disease update 2012 (01) 20120104.0027 2011
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