Protecting the blood supply from variant CJD: deferral of donors who have received a blood transfusion

Additional information for health care professionals

1) About CJD

Creutzfeldt-Jakob-Disease (CJD) is one of a group of fatal diseases which invade the brain through an 'infectious protein' known as a prion. CJD causes dementia and a range of neurological symptoms, including unsteadiness and jerky movements. The disease affects about one person in a million per year, giving rise to 50 or so new cases a year in the UK. At present CJD can only be diagnosed for certain by *post mortem* examination of the brain.

There are four main types of CJD: of these, sporadic accounts for 85% of cases, having no known cause. The other types are familial, iatrogenic and variant.

Sporadic CJD (sCJD) affects mainly the over 50s and is of unknown cause. The course of the disease is typically measured in months. SCJD is most common in the 45-75 year age group with the peak age of inset being 60-65 years. The number of cases of sCJD in the UK has increased since 1970, when figures first started being kept. In 1970-71 there were 21 deaths from sCJD and in 2002 there were 67 deaths. Most of the increase has occurred since 1990 and in the over 70 age group. It is not clear whether this is due to greater awareness of CJD among the medical profession, or whether it represents a genuine increase in the incidence of the disease. There is no evidence of any link between sCJD and BSE (bovine spongiform encephalopathy). 70% of patients die within six months of onset of symptoms. Rarely, sCJD lasts for several years.

Familial CJD is inherited, with younger onset and usually a longer time course than sCJD.

Iatrogenic CJD occurs through contamination with infected tissue via medical procedures such as treatment with human growth hormone.

Variant CJD (vCJD) was first identified in 1996 and is believed to be caused by exposure to BSE (bovine spongiform encephalopathy) and typically affects younger people. It has a relatively longer time course than most other forms, with an average of 14 months between onset of symptoms and death. Early symptoms are often psychiatric, such as anxiety and depression, and there may be persistent pain, with odd sensations in the face and limbs. More obvious neurological symptoms and progressive dementia follow. As at December 2003, 143 cases of vCJD have been reported in the UK. It is thought that the epidemic has reached its peak. There was no increase in the incidence of vCJD between 1994 and 1997. 11 cases have also been diagnosed abroad. If the disease comes

from exposure to infected beef products prior to the ban of specified offal in human food in 1980, as is now widely accepted, then there could be more cases if the incubation period is very long. However, without knowing the exact route of the infection, or who is most at risk and why, it is currently impossible to predict how many more cases of vCJD there will be.

In the UK all cases of suspected CJD are reported to the National CJD Surveillance Unit (NCJDSU) in Edinburgh. The number of cases is published on their website at www.cjd.ed.ac.uk/figures.htm

2) Abnormal prion protein

The infectious agent is thought to be an abnormal form of prion protein called PrP. In its normal form, PrP occurs in the brain and other parts of the body in humans and a wide range of animals. The function of the normal PrP protein is unknown. Unlike bacteria and viruses, prions are not completely inactivated by heat, ultraviolet light or other standard sterilisation procedures.

Vulnerability to this change can be inherited or it may occur for no known reason, as in sCJD. No firm link between the occurrence of CJD and risk factors such as sex, occupation or diet has been shown.

3) Iatrogenic transmission

Apart from the recent report of possible transmission of vCJD through blood transfusion, there are no reports of transmission through medical procedures. A few people have contracted other forms of CJD from brain operations using instruments previously used on someone with CJD. The prion agent survives the disinfection processes which normally destroy bacteria and viruses. Intracerebral transmission of CJD has also occurred with corneal transplants and grafts of dura mater, the tough membrane which covers the brain. There are no recorded instances of CJD being spread through other types of surgery.

CJD has also been transmitted by treatment with growth hormone extracted from human pituitaries. Human growth hormone used to treat children with short stature was in the past prepared from human pituitary glands. To date 2,000 people have been treated with this form of growth hormone in the UK and there have been 27 cases of CJD since 1990 arising from this cause. There could therefore be more growth hormone cases to come. Growth hormone has not been made from human sourced pituitary glands since 1986.

4) Transmission of vCJD via blood components

In vCJD, the disease process involves many tissues, including the lymphoid tissue. Blood components are derived from a single blood or plasma donation or, in the case of platelets, a small pool usually of about four donations. These are labile products with a short shelf life. Blood components include whole blood; red cell concentrates; platelets (cell fragments involved in blood clotting); granulocytes (a form of white blood cell); fresh frozen plasma; and cryoprecipitate (made by freezing and thawing plasma).

Most modern treatments use blood components rather than whole blood. Preparations of red cells, platelets and plasma contain varying amounts of the other components. Patients usually receive more than one unit in a transfusion, and may be transfused several times. However a patient is unlikely to receive more than one unit of a blood component from the same donor. Even low infectivity levels could be important because large quantities of blood and plasma derivatives are used to treat individual patients. These quantities greatly exceed the trace amount of protein remaining on surgical instruments after decontamination.

The National Blood Service (NBS) works with other organisations to determine whether there is any link between the development of vCJD and blood transfusions. When people are diagnosed with vCJD by the NCJDSU, the NBS is informed and a check made as to whether the patient donated blood. In December 2003, the first possible transmission of vCJD by blood transfusion was described. The transfusion occurred in 1996, the donor was well when they donated blood but went on to develop symptoms of vCJD in 1999 and died the following year. The recipient was diagnosed with vCJD in 2003. It is possible that vCJD was transmitted by the blood components. Therefore this may be the first documented case of vCJD transmitted by blood components.

To date (March 2004) 17 individuals in the UK are known to have received components of blood donated by people subsequently diagnosed with vCJD.

5) Public health protection against CJD

Prion diseases are transmissible in certain circumstances, but they are not infectious in the usual way. They are not spread by airborne droplets or by sexual contact. Contact with a CJD patient does not lead to an increased risk of developing the condition and no special precautions are required

Iatrogenic CJD is guarded against by destroying surgical instruments that have been used on people with CJD and by not accepting donations of blood, tissue or organs from people diagnosed with CJD or at increased risk of developing CJD. A number of measures have been implemented by the government to minimise the risk of contracting variant CJD from BSE infected meat and meat products.