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REVIEW ARTICLE **OPEN ACCESS**

A Rare Terminal Disease – CJD

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ABSTRACT
Creutzfeldt-Jakob disease (CJD) is a transmissible spongiform encephalopathy caused by the accumulation of an abnormal isoform of a cellular glycoprotein known as the prion protein. CJD belongs to a family of diseases known as prion *diseases derived from "protein" and "infectious. It is a terminal disease, but it is rare. CJD occurs worldwide and the estimated annual incidence in many countries, including the United States, has been reported to be about one case per million population. Onset of symptoms typically occurs at about age 60. Types of CJD are Sporadic, familial and acquired CJD. A form called variant CJD can be acquired by eating meat from cattle affected by a disease similar to CJD, called bovine spongiform encephalopathy (commonly called "mad cow" disease). CJD cannot be transmitted through the air or through touching or most other forms of casual contact.). CJD cannot be transmitted through the air or through touching or most other forms of casual contact. CJD is rapidly progressive. About 70 percent of individuals die within one year. In the early stages of disease, people may have failing memory, behavioral changes, lack of coordination and visual disturbances. As the illness progresses, mental deterioration becomes pronounced and people may develop involuntary movements, blindness, and weakness of extremities. People eventually lose the ability to move and speak, and enter a coma. Tests that help in the diagnosis of CJD include electroencephalography, detection of certain proteins in the fluid that surrounds the brain and spinal cord, and magnetic resonance imaging. The only way to confirm a diagnosis of CJD is by brain biopsy or autopsy. A brain biopsy is discouraged unless it is need to rule out a treatable disorder. There is no treatment that can cure or control CJD, although studies of a variety of drugs are now in progress. Current treatment is aimed at alleviating symptoms and making the person as comfortable as possible. This article will be helpful to explore the knowledge about the comprehensive review of Creutzfeldt-Jakob Disease.*
Keywords: *Creutzfeldt-Jakob Disease, Sporadic, Iatrogenic, Mad cow, National Prion Clinic.*

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INTRODUCTION

Creutzfeldt-Jakob disease (CJD) is caused by an abnormal infectious protein in the brain called a prion.[1,2] These prions accumulate at high levels in the brain and cause irreversible damage to nerve cells. While the abnormal prions are technically infectious, they're very different from viruses and bacteria. For example, prions aren't destroyed by the extremes of heat and radiation used to kill bacteria and viruses, and antibiotics or antiviral medicines have no effect on them. Proteins are molecules made up of amino acids that help the cells in our body function. Prions [3] are misfolded prion proteins that build up in the brain and cause other prion proteins to misfold as well.[4] This causes the brain cells to die, releasing more prions to infect other brain cells. Eventually, clusters of brain cells are killed and deposits of misfolded prion protein called plaques may appear in the brain. Prion infections also cause small holes to develop in the brain, so it becomes sponge-like. The damage to the brain causes the mental and physical impairment associated with CJD, and eventually leads to death.[5] Prions can survive in nerve tissue, such as the brain or spinal cord, for a very long time, even after death. CJD can be transmitted from an affected person to others, but only through an injection or consuming infected brain or nervous tissue. There's no evidence that sporadic CJD is spread through ordinary day-to-day contact with those affected or by airborne droplets, blood or sexual contact. But in the UK, variant CJD has been transmitted on 4 occasions by blood transfusion.[6-8]

MAIN CATEGORIES OF CJD ARE

- Sporadic CJD, which occurs for no known reason
- Hereditary CJD, which runs in families [9]
- Iatrogenic CJD- Iatrogenic CJD[10] is where the infection is accidentally spread from someone with CJD through medical or surgical treatment. For example, a common cause of iatrogenic CJD in the past was growth hormone treatment using human pituitary growth hormones extracted from deceased individuals, some of whom were infected with CJD.[11]
- Acquired CJD, which occurs from contact with infected tissue, usually during a medical procedure
- Cattle can get a disease related to CJD called bovine spongiform encephalopathy (BSE) or "mad cow disease." There is concern that people can get a variant of CJD from eating beef from an infected animal, but there is no direct proof to support this. [12,13]

SYMPTOMS

The pattern of symptoms can vary depending on the type of Creutzfeldt-Jakob disease (CJD).

In sporadic CJD, the symptoms[14,15] mainly affect the workings of the nervous system (neurological symptoms) and these symptoms rapidly worsen in the space of a few months. In variant CJD, symptoms that affect a person's behaviour and emotions (psychological symptoms) will usually develop first. These are then followed by neurological symptoms [16] around 4 months later, which get worse over the following few months. Familial CJD has the same sort of pattern as sporadic CJD, but it often takes longer for the symptoms to progress – usually around 2 years, rather than a few months. The pattern of iatrogenic CJD is unpredictable, as it depends on how a person became exposed to the infectious protein (prion) that caused CJD. [17]

Initial neurological symptoms of sporadic CJD can include: Difficulty walking caused by balance and co-ordination problems, slurred speech, numbness or pins and needles in different parts of the body, dizziness and vision problems, such as double vision and hallucinations. Advanced neurological symptoms of all forms of CJD can include: Loss of physical co-ordination, which can affect a wide range of functions, such as walking, speaking and ataxia, muscle twitches and spasms, loss of bladder control and bowel control, blindness, dysphagia, loss of speech and loss of voluntary movement.

Initial psychological symptoms of variant CJD can include: Severe depression, intense feelings of despair, withdrawal from family, friends and the world around you, anxiety, irritability and insomnia. Advanced psychological symptoms of all forms of CJD include: Loss of memory, which is often severe, problems concentrating, confusion, feeling agitated, aggressive behavior, loss of appetite, which can lead to weight loss, paranoia and unusual and inappropriate emotional responses

Final stages

As the condition progresses to its final stages, people with all forms of CJD will become totally bedridden. They often become totally unaware of their surroundings and require around-the-clock care. They also often lose the ability to speak and can't communicate with their careers. Death will inevitably follow, usually either as a result of an infection, such as pneumonia , or respiratory failure, where the lungs stop working and the person is unable to breathe. Nothing can be done to prevent death in these circumstances and Advancements in palliative care (the treatment of incurable conditions) mean that people with CJD often have a peaceful death.

DIAGNOSIS

A diagnosis of Creutzfeldt-Jakob disease (CJD) is usually based on medical history, symptoms and a series of tests. A neurologist will carry out the tests to rule out other conditions with similar symptoms, such as Alzheimer's disease, Parkinson's disease, or a brain tumour. The only way to confirm a diagnosis of CJD is to examine the brain tissue by carrying out a brain biopsy or, more commonly, after death in a post mortem examination of the brain.

Tests for CJD

A clinical neurologist will rule out other conditions with similar symptoms. Some common signs of CJD by carrying out the following tests: MRI brain scan – uses strong magnetic fields and radio waves to produce a detailed image of the brain, and can show up abnormalities particular to CJD.[18-20] EEG – records brain activity and may pick up abnormal electrical patterns seen in sporadic CJD.[21,22] Lumbar puncture – a procedure where a needle is inserted into the lower part of the spine to draw out a sample of cerebrospinal fluid (which surrounds your brain and spinal cord) so it can be tested for a certain protein that indicates you may have CJD.[23] **Prototype blood test-** for variant CJD has also been developed by the prion unit at the Medical Research Council (MRC) and is available through the National Prion Clinic.[24] **Tonsil biopsy** – a small piece of tissue can be taken from the tonsils and checked for the abnormal prions found in variant CJD (they're not present in other types of CJD)[25] and **Genetic test** – a

simple blood test to find out whether you have a mutation (fault) in the gene that produces normal protein; a positive result may indicate familial (inherited) prion disease and Brain biopsy-During a brain biopsy,[26] a surgeon drills a tiny hole into the skull and removes a small piece of brain tissue using a very thin needle. It's carried out under general anaesthetic, which means the person will be unconscious during the procedure. As a brain biopsy carries the risk of causing brain damage or seizures (fits), it's only performed in a few cases where there's a concern that someone doesn't have CJD but some other treatable condition.

TREATMENT

There's no proven cure or control for Creutzfeldt-Jakob disease, but clinical studies are underway at the National Prion Clinic to investigate possible treatments. At present, treatment involves trying to keep the person as comfortable as possible and reducing symptoms with medicines.[27] Researchers have tested many drugs, including amantadine, steroids, interferon, acyclovir, antiviral agents[28,29], and antibiotics.[30,31] Studies of a variety of other drugs are now in progress. However, so far none of these treatments has shown any consistent benefit in humans. Current treatment for CJD is aimed at alleviating symptoms and making the individual as comfortable as possible. For example, psychological symptoms of CJD, such as anxiety and depression, can be treated with sedatives and antidepressants, and muscle jerks or tremors can be treated with medicines like clonazepam and sodium valproate. Any pain experienced can be relieved using powerful opiate-based painkillers. During later stages of the disease, changing the person's position frequently can keep him or her comfortable and helps prevent bedsores. A catheter can be used to drain urine if the individual cannot control bladder function, and intravenous fluids and artificial feeding also may be used.

Advance directive

Many people with CJD draw up an advance directive.[32] An advance directive is where a person makes their treatment preferences known in advance in case they can't communicate their decisions later because they're too ill. Issues that can be covered by an advance directive include: whether a person with CJD wants to be treated at home, in a hospice, or in a hospital once they reach the final stages of the condition, what type of medications they'd be willing to take in certain circumstances, whether they'd be willing to have a feeding tube if they were no longer able to swallow food and liquid, whether they're willing to donate any of their organs for research after they die (the brains of people with CJD are particularly important for ongoing research) and if they lose lung function, whether they'd be willing to be resuscitated by artificial means – for example, by having a breathing tube inserted into their neck. The care team can provide more advice about making an advance directive. A specialist team such as doctor and nurse from these services will be assigned to liaise with local services, including the person's GP, social worker, physiotherapist and occupational therapist. Specialist teams are available for diagnosis and to offer clinical and emotional support to patients and their families, and work alongside the local care team. A local care team may include doctors and nurses, occupational therapists, dietitians, continence advisers and social workers.

Care and support in the advanced stages of CJD

As CJD progresses, people with the condition will need significant nursing care and practical support. As well as help with feeding, washing and mobility, some people may also need help peeing. A tube inserted into the bladder to drain urine (a catheter) is often required. Many people will also have problems swallowing, so they may have to be given nutrition and fluids through a feeding tube. It may be possible to treat someone with CJD at home, depending on the severity and progression of their condition. Caring for someone with CJD can be distressing and difficult to cope with, so many careers prefer to use the specialist services of a hospital or hospice.

PREVEN TION

Although Creutzfeldt-Jakob disease (CJD) is very rare, the condition can be difficult to prevent. This is because most cases occur spontaneously for an unknown reason (sporadic CJD) and some are caused by an inherited genetic fault (familial CJD). Sterilisation methods used to help prevent bacteria and viruses spreading also aren't completely effective against the infectious protein (prion) that causes CJD. But tightened guidelines on the reuse of surgical equipment mean that cases of CJD spread through medical treatment (iatrogenic CJD) are now very rare. There are also measures in place to prevent variant CJD spreading through the food chain and the supply of blood used for blood transfusions.

Protecting the food chain

Since the link between bovine spongiform encephalopathy (BSE, or "mad cow" disease) and variant CJD was confirmed, strict controls have been in place to stop BSE entering the human food chain.[33-35] These controls include: a ban on feeding meat-and-bone mix to farm animals, the removal and destruction

of all parts of an animal's carcass that could be infected with BSE, ban on mechanically recovered meat (meat residue left on the carcass that's pressure-blasted off the bones) and testing on all cattle more than 30 months old (experience has shown that infection in cattle under 30 months of age is rare, and even cattle that are infected haven't yet developed dangerous levels of infection).

Blood transfusions

In the UK, there have been 4 cases where variant CJD has been transmitted by blood transfusion. In each case, the person received a blood transfusion from a donor who later developed variant CJD. Three of the 4 recipients went on to develop variant CJD, while the fourth recipient died before developing variant CJD but was found to be infected following a post-mortem examination. It's not certain whether the blood transfusion was the cause of the infection, as those involved could have contracted variant CJD through dietary sources. Nevertheless, steps were taken to minimise the risk of the blood supply becoming contaminated. These steps include: not allowing people potentially at risk from CJD to donate blood, tissue or organs (including eggs and sperm for fertility treatments), not accepting donations from people who have received a blood transfusion in the UK since 1980 and removing white blood cells, which may carry the greatest risk of transmitting CJD, from all blood used for transfusions.

Avoid to Spreading the Disease

To reduce the already very low risk of CJD transmission from one person to another, people should never donate blood, tissues, or organs if they have suspected or confirmed CJD, or if they are at increased risk because of a family history of the disease, a dura mater graft, or other factor. Normal sterilization procedures[36] such as cooking, washing, and boiling do not destroy prions. Caregivers, healthcare workers, and undertakers should take the following precautions when they are working with a person with CJD: Cover cuts and abrasions with waterproof dressings, wear surgical gloves when handling a patient's tissues and fluids or dressing the patient's wounds, avoid cutting or sticking themselves with instruments contaminated by the patient's blood or other tissues[37], use disposable bedclothes and other cloth for contact with the patient, if disposable materials are not available, regular cloth should be soaked in undiluted chlorine bleach for an hour or more, and then washed in a normal fashion after each use, use face protection if there is a risk of splashing contaminated material such as blood or cerebrospinal fluid and soak instruments that have come in contact with the patient in undiluted chlorine bleach for an hour or more, then use an autoclave[38] (pressure cooker) to sterilize them in distilled water for at least one hour at 132-134 degrees centigrade.[39,40]

CONCLUSION

Creutz-feldt Jakob Disease is a degenerative brain disorder that leads to dementia and, ultimately, death. Creutz-feldt Jakob Disease is a terminal disease, but it is rare. There's no proven cure or control for Creutzfeldt-Jakob disease (CJD). Normal sterilization procedures such as cooking, washing, and boiling do not destroy prions. Sterilisation methods used to help prevent bacteria and viruses spreading also aren't completely effective against the infectious protein that causes CJD. But tightened guidelines on the reuse of surgical equipment mean that cases of CJD spread through medical treatment (iatrogenic CJD) are now very rare. There are also measures in place to prevent variant CJD spreading through the food chain and the supply of blood used for blood transfusions. Current treatment for CJD is aimed at alleviating symptoms and making the individual as comfortable as possible. The best way is to avoid the spreading of disease CJD transmission from one person to another, people should never donate blood, tissues, or organs if they have suspected or confirmed CJD. Caregivers, healthcare workers, and undertakers should take the above said preventive measures and precautions when they are working with a person with CJD will avoid the spreading of the disease.

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