Human Version of Mad Cow Disease?

The young woman's decline began almost imperceptibly, with lapses into confusion and disorientation. Her short-term memory ebbed. Hallucinations battered her reason. Her behavior became childlike. She soon lost control of her bladder and of her limbs, which twitched spasmodically.

Abruptly, at age 28, she died. It took a brain biopsy to disclose why.

Physicians found that her brain had become as porous as a sponge, a characteristic of the malady known as Creutzfeldt-Jakob disease (CJD). They assert in the April 6 LANCET that she was 1 of 10 people in the United Kingdom to suffer from a newly recognized variant of the disease.

Indeed, the new variant looks as if bovine spongiform encephalopathy, or mad cow disease, may have emerged in humans, says Robert G. Will of the National CJD Surveillance Unit in Edinburgh and an author of the report. The two illnesses may even be caused by the same agent, says Will. "It is a cause for great concern."

Will believes the similarity of the 10 cases "may indicate infection by a common strain of the causative agent," believed to be transmitted through certain medical procedures or through meat from infected livestock.

Some health officials believe the widely publicized cases may signal the start of a larger epidemic.

Although CJD afflicts just 1 in 1 million people worldwide each year, the new cases have touched off a panic in Europe, prompting a widespread ban on imports of British beef and the decision to slaughter 11 million apparently healthy cattle in the United Kingdom. At present, only circumstantial evidence links the bovine and human diseases. Moreover, it is impracticable to screen asymptomatic animals for the infectious agent.

No one knows precisely how the agent is transmitted, and no common thread has emerged to link the 10 recent victims.

Neither the young woman nor the other sufferers had been exposed to the malady through a medical route—neurosurgery, blood transfusion, or transplant of infected tissues—the researchers say. Although one victim had been a vegetarian for 5 years, all had eaten beef over the last decade. None was reported to have eaten brain, the organ thought most likely to harbor infectious particles.

The physicians are further perplexed by the differences between the newly reported cases and classic CJD. For instance, sufferers with the new strain ranged in age from 18 to 41, with an average age at death of 27, whereas CJD usually strikes people over 60. The younger patients took, on average, a year to die, more than twice the time it takes older patients. In the new cases, nerve cells in the brain were more liberally scarred with amyloid plaques, gummy deposits usually associated with Alzheimer's disease.

Lawrence Schonberger of the Centers for Disease Control and Prevention in Atlanta says the cluster of cases is "absolutely extraordinary." In the United States, he says, "the incidence of cases in people younger than 30 would total five per billion per year." Typically, classic CJD strikes 250 people in the United States each year.

He and other CDC officials were sufficiently intrigued—and concerned—by the recent British report to implement routine surveillance for the disease in California, Connecticut, Minnesota, and Oregon as part of an ongoing effort to identify emerging infections.

This brain-destroying illness was first identified in the 1940s in goats and sheep. It was named scrapie, for the afflicted animals' tendency to rub their hides raw.

The illness emerged in cattle in 1986 in the United Kingdom, after feed producers began using sheep organs as filler in cattle feed. The British banned the practice 3 years after the first bovine cases appeared.

Nevertheless, between 1986 and 1995, British herds suffered 161,663 cases, the world's largest epidemic of the disease. Since that time, the incidence has decreased.

Will has logged 207 cases of CJD in humans since 1990. The 10 unusual cases emerged from these data. Schonberger says the pattern of the deaths in the new cases—one in May 1995, two in November, two more in January 1996, and three in February—suggests that they may represent an expansion of the epidemic. "It is too early to predict how many more cases will occur. However, if we assume that these 10 cases relate to exposure in the mid to late 1980s . . . it would represent an incubation period of 5 to 10 years," the researchers report.

Both the livestock and human diseases are thought to be caused by a mysterious protein known as a prion, although no one knows precisely how a prion inflicts damage. It doesn't contain genetic material, once assumed to be essential for an infectious agent to thrive and multiply. Even more puzzling, a prion is produced by the normal human genome, not by a foreign infectious agent.

These prions appear in both normal people and those with CJD. The only apparent difference is that the versions found in CJD patients seem more resistant to heat, enzymes, and solvents than ordinary prions. Some researchers theorize that the shape of the CJD versions is altered, causing the fatal disease.

Researchers at the Nagasaki University School of Medicine in Japan report in the April 11 NATURE that, under certain conditions, prions appear to be essential to the survival of specific nerve cells in mice. This finding suggests that lack of normal prions may be important not just in CJD, say Suehiro Sakaguchi and his colleagues, but also in aging and other degenerative brain diseases. —*S. Sternberg*