RESEARCH SUMMARY

Levels of abnormal prion protein in dental tissue

Investigation of PrP^{res} in dental tissues in variant CJD

M. W. Head, D. Ritchie, V. McLoughlin and J. W. Ironside **Br Dent J 2003; 195: 339–343**

Objective
To study the distribution of disease-associated prion protein (PrP) in oral and dental tissues in variant CJD.

Design
Prospective single centre autopsy based study.

Setting
Within the National CJD Surveillance Unit, UK, 2000-2002.

Materials and methods
Patients with suspected variant CJD undergoing autopsy where permission to remove tissues for research purposes had been obtained from the relatives. Fixed and frozen autopsy tissues from the brain, trigeminal ganglion, alveolar nerve, dental pulp, gingiva, salivary gland, tongue and tonsils were studied by Western blot, PET blot and immunocytochemistry to detect disease-associated PrP.

Results
Disease-associated PrP was only detected in the brain, trigeminal ganglia and tonsils.

Conclusions
The failure to detect disease-associated PrP in most dental and oral tissues will help inform ongoing risk assessments for dental surgery in relation to the possible iatrogenic transmission of variant CJD via dental instruments.

IN BRIEF

- Previous studies have indicated that dental surgery is not a risk factor for sporadic CJD, but in variant CJD the tissue distribution of infectivity is much wider, raising concerns over transmission *via* dental surgical instruments.
- A range of dental tissues were studied for the presence of the abnormal form of the prion protein, using a combination of immunohistochemistry and a sensitive Western blot assay.
- Abnormal prion protein was detected in the trigeminal ganglia, tonsil and lymph nodes in variant CJD but not in sporadic CJD cases. Alveolar nerves, gingiva, dental pulp, tongue and salivary gland tissue were negative in all cases. Lymphoid tissues (including tonsil) were negative in sporadic CJD.
- Since the presence of the abnormal form of the prion protein is associated with infectivity, these findings indicate that the highest levels of infectivity in dental tissues are likely to be found in the tonsil and associated lymphoid tissues. This does not exclude the presence of lower levels of infectivity in the negative tissues in our study.
- These new findings will be of use to inform the risk assessment on dental tissues and variant CJD.

COMMENT

The discovery of thermostable strains of the transmissible spongiform encephalopathy (TSE) agents, BSE and scrapie, together with convincing evidence that BSE and variant CJD are caused by the same agent, has led to concern that the diseases may be transmitted by surgical and dental instruments. This concern was justified by a risk assessment conducted by the Department of Health which concluded that 'Surgical transmission of vCJD cannot be ruled out as a risk to public health' (www.doh.gov.uk/cjd/riskassessmentsi.htm).

Further concerns come from the knowledge that infectivity is present in rodent models of TSE and infection can be transmitted to other rodents by inoculation into the tongue or dental pulp. Studies of reamers and files used in endodontic work have demonstrated that these instruments are extremely difficult, if not impossible, to clean, and residual protein is easily visible to the naked eye.

Of some consolation is the fact that dental procedures have not been associated epidemiologically with transmission of the sporadic form of CJD. In a small study, the abnormal (potentially infectious) form of the prion protein (PrP^{res}) was not detected in the dental pulp from patients with sporadic CJD.

Variant CJD agent is more widely distributed outside of the CNS, than agents of other forms of CJD. As most of the population of the UK have been exposed by diet to this agent and the number of individuals who are carriers of this infection is unknown, it is important to ascertain whether PrPres (and infectious prion) is present in dental tissues.

This paper is an important step forward, as no PrP^{res} was detected in the gingiva of three patients who had died of variant CJD, nor in the dental pulp and alveolar nerve of two of the patients. The authors emphasise however, that although this is encouraging, the limits of sensitivity of this technology mean that infectious agent could still be residing in the tissues and present a risk through instrument contamination. Thus, they stress the need to ensure that decontamination procedures, particularly washing and autoclaving, are maintained at a high level throughout the country.

Professor Donald J. Jeffries, Professor of Virology
Head of Department of Medical Microbiology, St Bartholomew's and the Royal London Hospitals
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