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*Custodit vitam qui custodit sanitatem  
Sed prior est sanitas quam sit curatio morbi  
(Flos Medicinae Scholae Salerni)*

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**Practical aspects of decontamination of the unconventional  
transmissible agents that cause sporadic and variant  
Creutzfeldt-Jakob disease and other similar human diseases**

*David Taylor*

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## ***Practical aspects of decontamination of the unconventional transmissible agents that cause sporadic and variant Creutzfeldt-Jakob disease and other similar human diseases***

David Taylor

SEDECON 2000, Edinburgh, UK

**Key words** TDE agents; Iatrogenic transmission; Decontamination.

**Summary** Although the unconventional agents that cause transmissible degenerative encephalopathies have not yet been completely characterised, they are known to be relatively resistant to decontamination procedures that are effective with conventional microorganisms. The implications for the safe decontamination and sterilisation of devices and instruments used in human medicine are discussed.

### **Aspetti pratici di decontaminazione degli agenti trasmissibili responsabili della malattia di Creutzfeldt-Jacob sporadica, della sua variante e di altre malattie collegate**

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**Parole chiave** Prioni; Decontaminazione; Sterilizzazione.

**Riassunto** Sebbene gli agenti responsabili delle encefalopatie trasmissibili non siano ancora stati completamente caratterizzati, è nota la loro elevata resistenza ai sistemi di decontaminazione efficaci invece nei confronti degli altri microorganismi.

Vengono discusse le problematiche relative ad una corretta decontaminazione e sterilizzazione di oggetti e strumenti in uso nella pratica medica.

### **La decontamination des Agents responsables de la maladie de Creutzfeldt-Jacob sporadique e des autres encephalopathies transmissibles**

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**Mots-clé** Agents de les encephalopathies transmissibles; Decontamination; Sterilisation.

**Résumé** Bien que les agents responsables des encephalopathies transmissibles n'aient pas encore été complètement caractérisés, leur résistance aux systèmes de decontamination qui son efficaces envers les autres micro-organismes, est bien connue.

Seront présentés les problematiques relatives pour la decontamination et sterilisation correcte des instruments utilisés en médecine pratique.

### **Praktische Aspekte der Dekontamination übertragbaren Proteine, Erreger der sporadischen Creutzfeldt-Jacob, ihrer Variante und ähnliche Krankheiten**

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**Schlüsselwörter** Prionen; Dekontamination; Sterilisation.

**Zusammenfassung** Obwohl die Erreger der übertragbaren Enzephalopathien noch nicht vollständig charakterisiert sind, ist doch ihre hohe Resistenz gegen die Dekontaminations-Systeme bekannt, welche gegenüber anderen Mikroorganismen ausreichend sind.

Es werden die Probleme einer korrekten Dekontamination und Sterilisation von Gegenständen und Instrumenten der medizinischen Praxis, diskutiert.

## Introduction

A number of unusual and fatal neurological diseases of humans and other mammalian species now form a distinct group described either as transmissible spongiform encephalopathies (TSEs) or transmissible degenerative encephalopathies (TDEs), as listed in the Table. As will be discussed, the unconventional transmissible agents that cause TDEs are known to be at least partially-resistant to most of the decontamination or sterilisation procedures that are effective with conventional microorganisms. This publication addresses the issue of the prevention of accidental transmission of the human diseases that can result from medical intervention. Although most of the strategies for inactivating the human agents have resulted from studying well-defined strains of the scrapie agent that have been cloned and passaged in laboratory rodents, these are widely accepted as being appropriate for this purpose.

## The nature of the causal agents

TDE agents are unconventional inasmuch that they are neither bacterial nor viral, and their true nature is still the subject of debate<sup>(1-4)</sup>. Nevertheless, there is little doubt that the infectious moieties are, at least partially, composed of post-translationally modified, disease-specific forms of the PrP protein that is expressed in its normal form in various tissues of mammalian species. The disease-specific, modified form of PrP is usually referred to as PrP<sup>Sc</sup>, whereas the normal form is described as PrP<sup>C</sup>. Regardless of the uncertainties about their precise molecular nature, it is well known that TDE agents are remarkably resistant to inactivation by procedures that inactivate conventional microorganisms<sup>(5-7)</sup>. TDEs are also known to have extremely long incubation periods that, in the case of the human diseases, can extend to decades<sup>(8)</sup>.

## Iatrogenic risks

Prior to 1996, the main concern regarding iatrogenic transmission of the human TDEs focused upon sCJD that affects around one in a million individuals worldwide per annum but has an unknown aetiology. However, there are regional variations in the incidence of sCJD. For example, Switzerland has had an incidence of around three in a million in recent years for unidentified reasons. The other human TDEs collectively have an incidence of between one and two cases per annum for every ten million of the worldwide population. There have been instances of accidental transmission of sCJD through the use of neurosurgical devices and instruments that were subjected to inadequate decontamination and sterilisation procedures<sup>(9,10)</sup>. A

survey also showed that individuals who had undergone neurosurgery were at a higher risk of developing CJD in later years compared with the controls<sup>(11)</sup>. This might have resulted from the use of inadequate sterilising procedures for neurosurgical instruments but the study did not provide any information regarding the sterilization procedures that had been used. Iatrogenic transmission has also occurred under circumstances where there had been, initially, no appreciation that special inactivation procedures might need to be applied. These include the accidental transmission of CJD through a) corneal grafting, b) the therapeutic use of human growth hormone extracted from the pituitary glands of human cadavers, and c) the use of cadaveric-derived human dura mater for surgical repair procedures<sup>(6)</sup>.

In 1996, it was reported that a new variant form of CJD (vCJD) had been observed in the UK<sup>(12)</sup>. There was also confidence that vCJD was not occurring elsewhere within the EU at that time because an earlier initiative by the EC had established a network of EU centres for CJD diagnosis within which uniform standards for clinical assessment and laboratory diagnosis had been established. In 1996, none of the EU centres outside the UK had observed any TDE that had the characteristics of vCJD. Consequently Will et al were driven to the conclusion that the emergence of vCJD was likely to be associated with the enormous epidemic of BSE that had occurred in the UK, and that it had probably been acquired through the consumption of BSE-contaminated food-products<sup>(12)</sup>. Clear evidence that vCJD is caused by the BSE agent came from subsequent laboratory studies<sup>(13,14)</sup>. With regard to the likely association between BSE and vCJD it is relevant to note that more than 183,000 cases of BSE have been identified to date in the UK. In contrast, the total number of cases identified collectively in other EU countries is around 4,500. By February 2004, the number of definite or probable cases of vCJD in the UK was 146, and cases had also occurred elsewhere - France 6; Italy 2; Canada 1; Ireland 1; USA 1. However, the cases that were diagnosed in Canada, Ireland and the USA had lived in the UK at a time when they were likely to have been exposed to the BSE agent in food-products. In addition, one of the Italian cases was probably infected in France. It has been calculated that, before regulations were introduced in 1989 to remove specified risk materials from bovine carcasses in slaughter-houses, around half a million BSE-infected (but apparently normal) cattle were processed to provide meat and meat-products in the UK<sup>(15)</sup>. The current epidemiological data indicate that the incidence of vCJD in the UK may be declining, and this has resulted in a dramatically reduced estimate for the

number of cases that might still occur<sup>(16)</sup>. However, such estimates are complicated by the fact that all of the cases tested so far have been homozygous for methionine at codon 129 of their PrP genes. This codon also codes for valine, and all three possible codon 129 genotypes have been previously shown to be susceptible to various types of CJD-like disease. It is therefore possible that the other genotypes may be susceptible to vCJD but may simply have (possibly much) longer incubation periods<sup>(17)</sup>.

Initially, concerns regarding the potential iatrogenic transmission of vCJD in the UK related to the large number of cases that might occur. Concern regarding accidental human-to-human transmission was heightened when it was reported that all of the cases tested were shown to have PrP<sup>Sc</sup> in their lymph nodes, tonsils and spleens; this was in contrast to the situation with cases of sporadic or iatrogenic CJD where no PrP<sup>Sc</sup> was detectable in such tissues<sup>(18)</sup>. Also, the fact that lymphoid tissues could become infected before the onset of overt neurological disease was indicated by the finding of PrP<sup>Sc</sup> in the appendix of an individual eight months before they developed clinical vCJD<sup>(19)</sup>. This is consistent with the situation in sheep with scrapie in which PrP<sup>Sc</sup> can be detected in the spleen at six months of age, even though they do not show any signs of neurological disease until they are around two years old. The potential presence of PrP<sup>Sc</sup> in the lymphoid tissues of individuals that are silently incubating vCJD means that surgeons could be intentionally or incidentally traumatising vCJD-infected lymphoid tissues without any knowledge that these are infected. Recognising this problem, the UK Department of Health initiated a study in which the tonsil or appendix removed from 3,000 individuals without neurological disease were examined for the presence of PrP<sup>Sc</sup>. One further appendix sample tested positive<sup>(20)</sup>. However, it was recognised that the small-scale nature of the study did not provide an adequate national estimate for either a) the possible number of pre-clinical cases of vCJD that might be in the pipeline or b) the extent of the problem relating to surgical procedures involving the lymphoid tissues of pre-clinical cases. To address these issues, a study was initiated in which the anonymised appendix or tonsillar tissue of 100,000 individuals without neurological disease will be tested for PrP<sup>Sc</sup><sup>(20)</sup>.

Although the distribution of infectivity in different tissues appears to be greater in cases of vCJD compared with sCJD, there is a more recent indication that previously unsuspected tissues such as those in the olfactory pathway might become infected in sCJD-infected individuals. If this was to be confirmed, it would suggest a potential route for accidental transmission either through the use of anaesthetic equipment, or

by exposure to nasal secretions (or aerosols produced therefrom). However, there has been no indication in the past that sCJD has been transmitted from person-to-person through the use of anaesthetic equipment. Nor is there any indication that friends, family or nursing staff looking after individuals with clinical sCJD are at risk of developing the disease, despite their exposure to nasal secretions (and aerosols produced therefrom). It would seem that some time is needed to judge the relevance of recent claims regarding the distribution of infectivity in sCJD-infected individuals.

In the UK, further concern regarding the potential iatrogenic transmission of vCJD was raised by the much-publicised occurrence of vCJD in an individual that had received a blood-transfusion from a healthy individual who eventually developed vCJD<sup>(21)</sup>. The relevance of this finding will only become clear if there are further similar cases. In earlier studies, no infectivity was found in blood samples from vCJD-infected individuals that were injected into mice by the intracerebral route<sup>(22)</sup>. However, only a small volume of blood (20  $\mu$ l) could be injected into the brains of individual mice by this route of inoculation. In addition, the “species-barrier” effect has to be considered. Although it can never be proven formally, it is realistic to assume that the transmission of human TDE agents to mice will be less effective than transmitting the same agents to humans. There are numerous publications that testify to the “species-barrier” effect, and it has been shown that the efficiency of transmitting BSE to cattle is around 500-fold greater than transmitting it to mice (GAH Wells personal communication). A potentially more realistic appraisal of the risk associated with blood-transfusion in humans was obtained by studies in which 450 ml volumes of blood from sheep that had been experimentally-infected with BSE, or were naturally infected with scrapie, were collected at various times before the onset of clinical disease, and transfused into scrapie-free sheep. A number of the recipient sheep developed BSE or scrapie<sup>(23)</sup>. Although these studies were not complicated by the “species-barrier” effect, their relevance with regard to vCJD and blood transfusion in humans is still an open question.

### Decontamination procedures

Regarding the inactivation of CJD-like agents that might contaminate medical devices and surgical instruments, the number of reliable and practical options is small. Until the mid 1990s it was considered that a number of procedures was completely effective. These included exposure to a) 1M sodium hydroxide for an hour, b) sodium hypochlorite containing 20,000ppm available chlorine for an hour, c) gravity-

displacement autoclaving at 132°C for an hour, or d) porous-load autoclaving at 134-138°C for 18 minutes<sup>(24)</sup>. Further studies indicated that only the hypochlorite treatment appeared to be completely effective whereas the other processes were able to substantially, but incompletely, inactivate these agents<sup>(24)</sup>. However, the use of strong hypochlorite solutions is not a product- or user-friendly process. These damage stainless steel, and generate chlorine vapour that can be hazardous to the operators if they are not provided with appropriate respiratory protection. A further advance in the development of effective procedures was achieved by the discovery that TDE agents could be reliably inactivated when they are exposed consecutively or simultaneously to 1M sodium hydroxide and gravity-displacement autoclaving at 121°C. Although such methods of decontamination have been recommended in guidelines issued by the World Health Organisation<sup>(25)</sup>, there are practical problems associated with the use of these processes. For example, it has been reported that a variety of medical devices were irreparably damaged by their exposure to such procedures<sup>(26)</sup>. On the other hand, studies at the Neuropathogenesis Unit in Edinburgh (UK) have shown that several grades of stainless steel are undamaged by this type of exposure (Taylor & Fernie, unpublished observations). Similarly, the WR<sup>2</sup> company in the USA that uses hot alkali at a temperature of 150°C to dispose of animal carcasses has not experienced any degradation in the physical properties of their stainless steel reactor vessels that have been used for many years (G.Kaye, personal communication). It is clear that the nature of the materials that will survive alkaline autoclaving without significant damage needs to be clearly defined. Another problem that has arisen with regard to autoclaving in alkali is the exposure of personnel to hydroxide-contaminated vapour in the general environment by its release through thermostatic steam-traps that vent to the normal environment before the condensate is discharged to the drainage system<sup>(26)</sup>. Although sodium hydroxide solutions do not evaporate until they reach a temperature of 1390°C, water and aqueous solutions tend to “bump and splutter” during autoclaving. This means that aerosols containing sodium hydroxide can be produced and released, as described above. These types of problems would be overcome by using either the types of containment systems recommended by Taylor<sup>(24)</sup>, or high-security autoclaves that are produced e.g by the Fedegari company in Italy. High-security autoclaves retain all of the condensate that is produced during the autoclaving cycle, thus preventing the release of hydroxide-contaminated vapour into the general working environment. It is clear that the special methods described above could only be realistically applied to

selected instruments or devices that were associated with a specific risk of contamination with CD-like agents. For practical reasons, the vast majority of surgical instruments and medical devices will still have to be processed by the production-line systems that are customarily used in central sterilisation departments (CSDs). In this respect one observation is pertinent, at least with regard to the UK experience. This is that, for reasons of health and safety, nursing staff are being discouraged from carrying out the washing of instruments (that they previously carried out commonly) before sending them on for decontamination and sterilisation. Private conversations with the managers of CSDs have revealed that the decline of local washing has enhanced the problem of removing material that has dried onto the surfaces of devices and instruments. However, CSDs in the UK have facilities for the option of hand-washing instruments and devices before these are processed through automated washer-disinfectors as a prelude to steam sterilisation. Generally, hand-washing is applied routinely to instruments and devices that are recognised to be difficult to clean, or to individual items that are contaminated with significant amounts of blood, mucus, pus or tissue. Although TDE agents tend to adhere tenaciously to surfaces<sup>(27)</sup>, they can be removed by washing procedures<sup>(28)</sup>. Thus, there is the possibility in washer-disinfectors that TDE infectivity washed off the surface of one instrument could become re-attached to the surfaces of other instruments<sup>(29)</sup>. This makes it important to avoid processing instruments through washer-disinfectors if they have any known TDE-related risk.

With regard to the decontamination of endoscopes, it is relevant that none of the currently-used disinfectants are known to inactivate TDE agents. The active principles of these disinfectants are chlorine dioxide, glutaraldehyde, hypochlorous acid, ortho-phthaldehyde and peracetic acid. There are also methods that combine some of these disinfectants with a) succinealdehyde, b) glyoxal or c) Sactimed-I-Sinald. Published studies have demonstrated the inability of chlorine dioxide, glutaraldehyde and peracetic acid to inactivate TDE agents<sup>(30)</sup>, and the same is likely to be true for hypochlorous acid and ortho-phthaldehyde. It is also known that aldehydes fix proteins and consequently stabilise TDE agents. This makes them much more difficult to inactivate subsequently by other methods such as autoclaving<sup>(30)</sup>, and encourages infected proteinaceous material to bind intimately to the surfaces of endoscopes<sup>(31)</sup>. Specific advice has been published recently regarding the avoidance of protein-fixing disinfectants such as aldehydes for processing endoscope when contamination with

TDE agents is a possibility<sup>(32)</sup>. Of the remaining candidate disinfectants, hypochlorous acid appears to be the most appropriate because it is a single-use procedure in which a new batch of acid is generated every time that endoscopes are disinfected. In contrast, the other methods involve the sequential processing of endoscopes through the same batch of disinfectant for at least 24 hours. Under these conditions, it would be naive to consider that surviving infectivity could not become detached from infected endoscopes, and become attached to previously uninfected endoscopes that are processed subsequently. It has been reported that TDE infectivity binds intimately to surfaces when these are exposed to either undiluted or 10% homogenates of infected tissue<sup>(27)</sup>. Although this might suggest that any surviving TDE infectivity present on an individual endoscope might be retained on its surface, this may not necessarily be the case. For example, it has been reported that washing procedures can remove TDE infectivity from surfaces<sup>(28)</sup>, and concern has been expressed regarding the potential cross-contamination of instruments in washer-disinfectors<sup>(30)</sup>.

### Concluding remarks

Clearly, it would be useful if effective decontamination methods could be developed that are less harsh than those used at present, and do not fix proteins. In this respect, there are a number of ongoing studies looking at the combined effects of chaotropes, detergents, proteolytic enzymes, pH and temperature.

**Table - The transmissible degenerative encephalopathies**

Disease	Species affected
scrapie	sheep, goats, moufflon
transmissible mink encephalopathy (TME)	mink
chronic wasting disease (CWD)	elk, mule-deer*
bovine spongiform encephalopathy (BSE)	cattle, captive exotic ruminants
feline spongiform encephalopathy (FSE)	domestic cats, captive exotic felids
kuru	humans
sporadic Creutzfeldt-Jakob disease (sCJD)	humans
familial Creutzfeldt-Jakob disease (fCJD)	humans
variant Creutzfeldt-Jakob disease (vCJD)	humans
sporadic familial insomnia (SFI)	humans
fatal familial insomnia (FFI)	humans
Gerstmann-Straussler-Scheinker syndrome (GSS)	humans

\* mainly in the USA and Canada but some cases in Korea through importation of infected animals

**Literature**

- (1) Almond J and Pattison J. *Human BSE*. Nature 389, 437-438, 1997.
- (2) Chesebro B. *BSE and prions*. Science 279, 42-43, 1998.
- (3) Farquhar CF, Somerville RA and Bruce ME. *Straining the prion hypothesis*. Nature 391, 345-346, 1998.
- (4) Telling GC, Scott M, Mastrianni G, Gabizon R, Torchia M, Cohen FE, DeArmond SJ and Prusiner SB. *Prion propagation in mice expressing human and chimeric PrP transgenes implicates the interaction of cellular PrP with another protein*. Cell 83, 79-90, 1995.
- (5) Ernst DR, and Race RF. *Comparative analysis of scrapie agent inactivation methods*. Virol. Methods 41, 193-202, 1993.
- (6) Taylor DM, Fraser H, McConnell I, Brown DA, Brown KL, Lamza KA and Smith GRA. *Decontamination studies with the agents of bovine spongiform encephalopathy and scrapie*. Arch. Virol, 139, 313-326, 1994.
- (7) Taylor DM. *Inactivation of transmissible degenerative encephalopathy agents; A review*. Vet. J. 159, 10-17, 2000.
- (8) Brown P, Preece MA and Will. RG. 'Friendly fire' in medicine: hormones, homografts, and Creutzfeldt-Jakob disease. Lancet ii, 24-27, 1992.
- (9) Bernoulli C, Siegfried J, Baumgartner G, Regli F, Rabinowicz T, Gajdusek DC, Gibbs CJ: *Danger of accidental person-to-person transmission of Creutzfeldt Jakob disease by surgery*. Lancet i, 478-479, 1977.
- (10) Foncin JF, Gaches J, Cathala F, El Sherif E and Le Beau E. *Transmission iatrogene interhumaine possible de maladie de Creutzfeldt-Jakob avec atteinte des grains du cervule*. Rev. Neurol. 136, 280, 1980.
- (11) Will RG and Matthews WB. *Evidence for case-to-case transmission of Creutzfeldt-Jakob disease*. J. Neurol. Neurosurg. Psychiat. 45, 235-238, 1982.
- (12) Will RG, Ironside JW, Zeidler M, Cousens SN, Estibeiro K, Alperovitch A, Poser S, Pocchiari M, Hofman A and Smith PG. *A new variant of Creutzfeldt-Jakob disease in the UK*. Lancet 347, 921-925, 1996.
- (13) Bruce ME, Will, RG, Ironside JW, McConnell I, Drummond D, Suttie A, McCordle L, Chree A, Hope J, Birkett C, Cousens S, Fraser H and Bostock CJ. *Transmission to mice indicate indicate that 'new variant' CJD is caused by the BSE agent*. Nature 389, 498-501, 1997.
- (14) Hill AF, Desbruslais M, Joiner S, Sidle KCL, Gowland I and Collinge, J. *The same prion strain causes vCJD and BSE*. Nature 389, 448-450, 1997.
- (15) Anderson RM, Donnelly CA, and Ferguson NM. *Transmission dynamics and epidemiology of BSE in British cattle*. Nature 382, 779-788, 1996.
- (16) Ghani AC, Donnelly CA, Ferguson NM and Anderson RM. *Updated projections of future vCJD deaths in the UK*. Biomed. Central Infect. Dis. 3, 4-11.
- (17) Andrews NJ, Farrington CP, Ward HJ, Cousens SN, Smith PG, Molesworth AM, Knight RS, Ironside JW and Will RG. *Deaths from variant Creutzfeldt-Jakob disease in the UK*. Lancet 361, 751-752, 2003.

- <sup>(18)</sup> Hill AF, Butterworth RJ, Joiner S, Jackson G, Rossor MN, Thomas DJ, Frosh A, Tilley N, Bell JE, Spencer M, King A, Al-Sarraj S, Ironside JW, Lantos PL and Collinge J. *Investigation of variant Creutzfeldt-Jakob disease and other priondiseases with tonsil biopsysamples*. Lancet 353, 183-189, 1999.
- <sup>(19)</sup> Hilton DA, Fathers E, Edwards P, Ironside JW and Zajicek J. *Prion immunoreactivity in appendix before clinical onset of variant Creutzfeldt-Jakobdisease*. Lancet 352, 703-704, 1998.
- <sup>(20)</sup> <http://www.dh.gov.uk>.
- <sup>(21)</sup> Department of Health (UK). 2003. *House of Commons Statement by the Secretary Of State for Health*. <http://www.doh.uk/cmo/vcjdstatement.pff.2003>.
- <sup>(22)</sup> Bruce ME, McConnell I, Will RG and Ironside JW. *Detection of variant Creutzfeldt-Jakob disease infectivity in extraneural tissues*. Lancet 358, 208-209, 2001.
- <sup>(23)</sup> Hunter N, Foster J, Chong A, McCutcheon S, Parnham D, Eaton S, MacKenzie C and Houston F. *Transmission of prion diseases by blood transfusion*. J Gen. Virol. 83, 2897-2905, 2002.
- <sup>(24)</sup> Taylor DM. *Inactivation of prions by physical and chemical means*. J Hosp. Infection 43 (Supplement), 569-576, 1999.
- <sup>(25)</sup> WHO *Infection Control Guidelines for Transmissible Spongiform Encephalopathies*. Report of a WHO Consultation, Geneva, Switzerland, 23-26 March 1999.
- <sup>(26)</sup> McDonnell G and Burke P. *The challenge of prion decontamination*. Clin. Infect. Dis. 36, 1152-1154, 2003.
- <sup>(27)</sup> Zobely E, Fleschig E, Cozzio A, Enari M and Weissmann C. *Infectivity of scrapie prions bound to a stainless steel surface*. Mol. Med. 5. 240-243, 1999.
- <sup>(28)</sup> Groener A, Seyfert-Brandt W and Schafer W. *Prions are removed from material used in the production of plasma derivatives by standard cleaning procedures: abstract*. Blood 102, 4243.
- <sup>(29)</sup> Taylor DM and Bell JE. *Prevention of iatrogenic transmission of CJD*. Lancet 341, 1543-1544, 1992.
- <sup>(30)</sup> Taylor DM. *Transmissible degenerative encephalopathies. Inactivation of the unconventional causal agents*. In: Fraise AP, Lambert PA and Maillard J (eds) Russell, Hugo & Ayliffe's Principles and Practice of Disinfection Preservation and Sterilisation. Blackwell, Oxford, 324-341, 2004.
- <sup>(31)</sup> The report of a working party of the British society of gastroenterology endoscopy committee. *BSG guidelines for decontamination of equipment for gastrointestinal endoscopy*, 2003.
- <sup>(32)</sup> Advisory Committee for Dangerous Pathogens and Spongiform Encephalopathy Advisory Committee. *Transmissible Spongiform Encephalopathy Agents: Safe Working and the Prevention of Infection*. London, HMSO, 2003.

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