

## The Role of Prions in Dentistry - A Need to be Concerned and Known

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**Received:** March 06, 2020; **Published:** November 28, 2020

### Abstract

Prions are proteinaceous infectious and transmissible particles that also lack nucleic acids. They are non-curable disorders affecting the nervous system, causing the degeneration, which can affect animals as well as humans. Prions are said to be the cause of Creutzfeldt-Jakob Disease of humans, Transmissible Spongiform Encephalopathy, Bovine Spongiform Encephalopathy and Chronic Wasting Disease. Prions resist the conventional sterilization procedures and hence the dentists must be aware of such diseases to opt standard methods of infection control and decontamination for such infectious agents.

**Keywords:** *Neurons; Prions; Cellular Prion Proteins; Sterilization*

### Introduction

Prion diseases were first discovered by Stanley B. Prusiner who defined prions as infectious, transmissible proteinaceous particles that lack nucleic acid and are composed exclusively of a modified isoform of the noninfectious cellular prion protein (PrP<sup>C</sup>) [1]. Prions are the cause of transmissible spongiform encephalopathies (TSEs), including scrapie in sheep, chronic wasting disease (CWD) in deer, bovine spongiform encephalopathy (BSE) in cattle (commonly known as «mad cow disease»), and Creutzfeldt-Jakob disease (CJD) in humans [2].

### Prion proteins

The protein, PrP<sup>C</sup>, is found particularly in neuronal cells, which is a cell surface protein, and is the normal form of the protein.

The diseased form of protein, referred to as PrP<sup>Sc</sup> (Prion protein in Scrapie) is found only in infected brains, is insoluble in detergents and partially resistant to protease treatment [3,4].

### Oral manifestation

Dysarthria, orofacial dysesthesia, dysphagia, dysgeusia, and in some cases paresthesia have been found [5].

The dental team should be aware of the principles of proper sterilization, disinfection and infection control, as the prions are said to be highly resistant to inactivation and can survive the high temperatures while autoclaving [6]. Diseases caused by the prions will not transfer through social contacts, airborne droplets blood components or plasma products. Care should be taken while treating patients with known prion diseases because most of the transmissions occur by the contaminated dental instruments [3].

WHO prefers the single-use of instruments, such as disposable needles and cartridges. As endodontic instruments are in contact with the dental pulpal tissue of the patients, they might transfer prions from the infected patients, that is, reuse of the endodontic instruments like reamers and files are chance of transfer of prion disease. So, to reduce any potential risk of disease transfer, dentist should be educated about the single-use of endodontic instruments. Thorough cleaning and steam autoclaving of heat resistant instruments at 134 degrees Celsius for 18 minutes are recommended [7].

### Guidelines for treating and preventing prion disease

- Incineration of all instruments and extracted tooth, and referral to multispecialty clinics are required in case of suspected individuals.
- Patients with confirmed prion disease should be scheduled at the end of the day to permit more extensive cleaning and decontamination.
- To reduce the risk of retraction of prions from oral fluids, avoid the usage of activating water lines.
- Avoid suction component and dental unit spittoon. Instead it is preferable to use a standalone suction unit with a disposable reservoir.
- Disposable, impermeable cover sheets are used to cover the dental types of equipment in suspected individuals.
- Instruments that are used to treat the patients with confirmed cases of prion disease should be mandatorily discarded [7,8].

The World Health Organization recommendations for the sterilization of all heat-resistant instruments to ensure that they are not contaminated with prions:

1. Perform routine sterilization and disinfection process after immersing the instruments in 1N sodium hydroxide and place in a gravity-displacement autoclave at 121°C for 30 minutes.
2. Perform the routine sterilization and disinfection process after immersing the instruments in 1N sodium hypochlorite for 1 hour; transfer instruments to water; heat in a gravity-displacement autoclave at 121°C for 1 hour.
3. Perform the routine sterilization and disinfection process after immersing the instruments in 1N sodium hydroxide or sodium hypochlorite for 1 hour; remove and rinse in water; then transfer to an open pan and heat in a gravity-displacement (121°C) or in a porous-load (134°C) autoclave for 1 hour [9].

### Conclusion

Recently, prion diseases attained much of scientific and public awareness. The optimal standard of sterilization and disinfection for all infectious agents, including prions, during dental treatments is of at most importance because of the peculiar nature and structure of prions. Proper knowledge about the transmission, diagnosis, infection control, decontamination should be updated by the dentist to prevent iatrogenic induced infections.

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**Volume 15 Issue 12 December 2020**

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