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Sterilization of Small Dental Equipment Using Air Torch Plasma Produced by Microwave Discharge

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Characteristics of the microwave plasma sterilization has been studied in order to realize a rapid sterilization for medical devices. The glass pipe with inner diameter 11 mm wrapped by a stainless wire spirally is inserted into the stainless chamber with the dimension of 72 cm in length and 18cm in inner diameter. The chamber and the inside of the glass pipe are evacuated, and then the air flows into the inside of the glass pipe. When the microwave of 2.45GHz is absorbed to the stainless wire, air plasma is produced in the glass pipe. The sample microorganism used in this experiment is spore of *Geobacillus stearothermophilus* with various populations, and is put on the silicone point that is the small dental file having micro structures on its surface. After the treatment, the silicone point is soaked in culture medium for 24 hours, and then successful of the sterilization is confirmed by the color of pigment in the medium. The broad peak in the typical emission spectra of the plasma torch downstream would be attributed to nitrogen oxide radicals with long lifetime. The nitrogen oxide radical is the sterilization factor. Sterilization periods of bacilli on silicone points with various populations of 10^1 , 10^2 , 10^3 , 10^4 are determined to be treatment period of 25, 35, 45, 50 minutes, respectively. On the other hand, sterilization of a vial-type biological indicator with the population of 10^5 requires period of 30 minutes. Therefore, the sterilization of tiny dental equipments is found to be difficult due to micro structures on the surface of equipments.

Keywords

Sterilization

Microwave discharge

Torch plasma

Air Plasma