



## **Non-Thermal Atmospheric Pressure Plasma Jet in Dentistry – From Killing to Saving**

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The research and the interest towards the non-thermal atmospheric pressure plasma (NTAPP) for the application in the field of dentistry has been rapidly expanding due to its portability and ability to be applied without damage to biomaterials and tissues. In last 10 years or so, we have examined various possibilities of applying the NTAPP in dentistry. Herein, the research achievements on NTAPP application in dentistry related to both killing (anti-bacterial and anti-cancer) and saving (tissue regeneration) will be considered.

Inhibitions of bacteria attachment and growth on both dental materials and dental tissues are important in dentistry, as failure would result in dental caries, periodontal diseases and secondary infection following dental material application. Our studies have revealed that application of NTAPP on dental implant would inhibit bacterial attachment and cause bacterial death on the surface, where the mechanism was seemed to be related to bacterial wall structure. Also, application of NTAPP on bacteria either directly or through NTAPP exposed saliva indicated to be effective in bacterial death

Oral tissues are composed of both soft and hard tissues, which would be often difficult or impossible to regenerate once damaged. Hence, tissue regeneration has been focus of recent dental sciences. Dental implants are used to replace lost tooth/teeth and aid tissue regeneration around them. Attention towards research and markets related to dental implants have been increasing in recent few years due to both aging population and seek of better quality of life. We have examined the use of NTAPP on dental implant surface to improve both hard tissue and soft tissue regeneration. The results indicated that effects were not limited with normal cells, but also with inflamed cells; state that most of dental implant requiring patients would be in.

Also, application of NTAPP was shown to induce growth of gingiva, one of major soft tissue in periodontal region, as indicated by direct application on to the gingival cells.

These studies indicated that the application of NTAPP in dentistry is promising for both tissue regeneration and anti-bacterial effects. Further studies are currently being planned to consider pre-clinical evaluation of such tools using 3-dimensional organotypic oral tissue. The results are hope to aid development of NTAPP as next generation of medical device in dentistry.