



## **Nano Aeon: Looming Phase in Medical Dentistry- Prospects for the Future**

***Chidambaram RAMASAMY***

*Dept. of Prosthodontics, Faculty of Dentistry, AIMST University, Kedah, Malaysia*

**\*Corresponding Author:** Email: dr.ramasamyc@gmail.com

(Received 04 Feb 2015; accepted 10 Mar 2015)

### **Dear Editor-in-Chief**

The advancement of science is leading humanity to a new aeon: the era of nanotechnology. In simple terms, it refers to the technology exercised on materials at molecular level (less than 100 nanometers) (1). Foundation stone of this looming phase in dentistry was laid by Richard Feynman in 1959, a noble prize winning physicist (1). Nanotechnology has brought upon exorbitant changes in all perspectives of health care and dentistry is no exception. There is apprising sanguineness that nanotechnology applied to medicine and dentistry will bring portentous advances in the diagnosis, treatment and prevention of disease. Nanotechnology has immense potential, but social affairs of public acquiescence, ethics, regulation, and human safety must be contemplated before molecular nanotechnology can be seen as the feasibility of rendering high quality dental care to the community. Nanodentistry is a transpiring field with impelling potential, which will yield a new era of technologically advanced clinical tools and devices for oral healthcare. It will make possible the sustenance of impeccable oral health by employing nanomaterials, tissue engineering, and dental nanorobots (1). Engineered bio materials can prove to be a boon to the future patients who seek dental and medical care. Despite the advancement and awareness related to oral care, many patients still have the phobia of dental manoeuvres. Primary element behind the patients in averting the dental visit is pertinent to fear of pain and needle (2).

Who does not fear for a needle injection? The latter question could be removed from dental history by the application of nano anaesthesia in near future. It totally eradicates the phobia by rendering an anxiety free and needless injection, thereby comforting the patient. Nanodental techniques implicate many tissue engineering procedures for major tooth overhaul (1). Nanorobots produce and deliver a homologous unabridged tooth that colligates both mineral and cellular components which aids to replete the tooth restoration in short duration (1). Pain intensity is comparatively more in a hypertensive tooth on par with the natural one, by virtue of affected dentinal tubules. Dental nanorobots could judiciously and accurately impede distinctive tubules within minutes, rendering patients a prompt and enduring treatment (1). Orthodontic nanorobots could directly manoeuvre the periodontal tissues allowing expeditious and painless tooth straightening, rotating and vertical repositioning within short period of time. This application would eradicate the ponderous use of braces in patients (1). Nanotechnology might provide novel strategies in preventive dentistry, particularly in control and management of bacterial bio films or demineralization of sub-micrometre-sized tooth decay (1). Traditional application of fluoride toothpastes have been conquered by the nanotech tooth pastes, by virtue of incorporating hydroxyapatites (3). With such efficiency, any teeth could be protected from caries using nano technology. Periodontal disease is one of the ma-

major oral inflammatory diseases, which is encountered in the heyday practice of dentistry, secondary to dental caries. These are infections, and many forms of the disease are cogitated with specific pathogenic bacteria, which colonize the subgingival area. The successful management of periodontal diseases can be accomplished by the traditional clinical procedures of scaling, root planning and periodontal flap surgery. Recently, the regenerative protocol has brought in more attention respective to periodontal diseases. Incumbent investigators have undertaken fabrication of novel biomaterials, for three-dimensional cell culture and tissue engineering, with the aid of natural process. These particles have been claimed to significantly reduce inflammation at the experimental sites. Nano particles could penetrate even the inaccessible regions like subgingival pocket areas, owing to their miniature (4). The captivating mechanism which has revolutionized the dental discipline in recent years is implantology. Osseointegration provides an insight into mechanism of bone healing around implants. The principle behind osseointegration of commercially pure titanium is the formation of bone-titanium interface through the intermediary layer of titanium oxide which is formed on the surface of implant by the process of oxidation. Nanoparticle incorporation on the implant fixtures has opened the gates for nanotechnology with regard to implant dentistry (5). Nanostructured implant coatings in use are diamond, which possess improved hardness, toughness and low friction which aids to overcome the adhesion problems. Implants have been coated with nanocrystalline diamonds to apprise the surface area and expedite immobilization of bone morphogenic protein (5). Thereby the longevity of implant fixture is improved through the effective mechanical interlock at bone-to-implant interface. Recent investigations vindicate that material with nanopatterned surface, exhibit better osseointegration when compared to conventional materials. One such biomaterial which has perceived overwhelming response in current years is attributed to Ca P (calcium phosphate) coating. The chemical structure of Ca P resembles closely with the natural bone, which acclaims to be sub-

sisted as the preferred bio-engineered implant coating material (5). Nanotechnology has been a curtain raiser in bettering the bone-implant contact and positively improving the success rate of dental implants.

Outcome of the nanotechnology is prognosticated to bring about cogent betterment in public health. Nanotechnology's success rate is estimated to be of higher percentage when compared to conventional methods, because of the streaming ability to work at molecular level. The preferment of nanotechnology coupled with dentistry will open the wide door of opportunities in dental field. Moreover with the prelation of restorative materials, pharmacological strategies and newfangled medications will further meliorate the medical and oral care. Anticipated success can be relished when people accept the futuristic technology with open minds.

## Acknowledgements

The authors declare that there is no conflict of interest.

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