ISSN: 0975-833X

Available online at http://www.journalcra.com

International Journal of Current Research
Vol. 10, Issue, 07, pp.71904-71905, July, 2018

INTERNATIONAL JOURNAL OF CURRENT RESEARCH

RESEARCH ARTICLE

NANOROBOTICS: GAMECHANGER OF ORTHODONTICS

[1,*]Varun Abrol and [2]Kahan Abrol

[1]Private Practitioner Abrol Dental Care, Patiala-14700
[2]Junior resident, Goc patiala-147001

ARTICLE INFO

Article History:
Received 20th April, 2018
Received in revised form
17th May, 2018
Accepted 10th June, 2018
Published online 31st July, 2018

Key words:

Dentistry, Nanorobots,
Nanotechnology, Nanodentistry,
Orthodontics.

ABSTRACT

The Nanodentistry is a science and technology of diagnosing, treating and preventing diseases, using nanoscale structured materials. Nanorobotics centers are self-sufficient machines which are functional at the nanoscale. The focus of this article is on application of nanoparticles in orthodontics. Nanotechnology, which concerns structures at the Nano scale, is considered as a vital current technology of the 21st century based on its economic and scientific potential. The future in orthodontic treatment will benefit enormously through nanotechnology should all the current attempts succeed to its clinical application at a reasonable cost to the orthodontist and patients.

Citation: Varun Abrol and Kahan Abrol. 2018. "Nanorobotics: Gamechanger of orthodontics", *International Journal of Current Research*, 10, (07), 71904-71905.

INTRODUCTION

Nanorobots are also known as nanites, or nanomachines, they are theoretical microscopic devices that are measured on the scale of nanometres. The growing interest in the development of nanotechnology in dentistry is leading to explore a new field called nanodentistry. Nanorobots have the potential to induce oral analgesia, desensitize tooth, manipulate the tissue to re-align and straighten irregular set of teeth and to improve durability of teeth. Nanodentistry is a science and technology of diagnosing, treating and preventing diseases, using nanoscale structured materials. The rapid advances in other fields have larger impact in all branches of dentistry, orthodontics is not an exception to this. Nanotechnology (Figure 1) has brought dentistry a miniature technology which has the ability to lessen the burden of dentist in near future. It is envisioned that Nanorobot will help dentists in managing complicated cases of microscopic level with easy and preciseness. Orthodontic nanorobots would directly manipulate the tissues of periodontium, which would allow rapid tooth aligning. The focus of this article is on application of nanoparticles in orthodontics. Nanotechnology, which concerns structures at the Nano scale, is considered as a vital current technology of the 21st century based on its economic and scientific potential. Nanorobotics (Figure 2) centers are self-sufficient machines which are functional at the nanoscale.

Corresponding author: **Varun Abrol**
Private Practitioner Abrol Dental Care, Patiala-14700.
DOI: https://doi.org/10.24941/ijcr.31582.07.2018

The theory of use of such nanorobots could be extended to dentistry and orthodontics in distant future, where nanorobots with specific motility mechanisms would navigate through periodontium to remodel it directly allowing accelerated orthodontic tooth movement. Another application of this technique is to reduce root resorption during orthodontic treatment. Orthodontic brackets have been coated with nitrogen doped titanium dioxide having antibacterial effects (Poosti, 2013). Nanomechanical sensors can be fabricated and be incorporated into the base of orthodontic brackets in order to provide real-time feedback about the applied orthodontic forces. Nanotechnology has made a giant step forward in overcoming problems like friction which interferes in the alignment or retraction of teeth during the treatment or white spot lesions and caries around the brackets (Batra, 2016). Friction may be reduced by using composite nanocoatings made of nickel-phosphorous and fullerenelike NPs of WS2 or Co and fullerene-like WS2 NP (Friedman, 2007). Friction may be also reduced, while maintaining strength, by modifying brackets with polysulfone-embedded hard alumina NPs (Batra, 2016). To overcome the problem of tooth decay around orthodontic brackets, antibacterial adhesives with different NPs such as TiO2, SiO2 or SNPs were tested and broadly discussed. It was shown that incorporating TiO2 NPs (1% w/w) into an orthodontic adhesive enhanced its antibacterial effects for 30 days without compromising physical properties (Poosti, 2013). Hollow wires are wires coated with NiTi/Ni-TiO2 composite nanoparticles via the synthesis method called ultrasonic spray pyrolysis (USP).

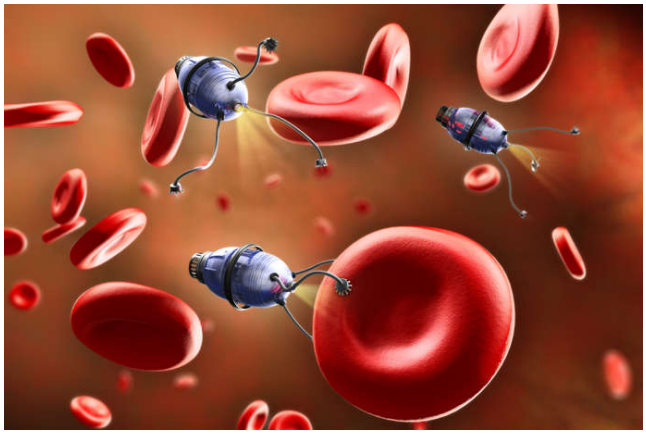

Figure 1.

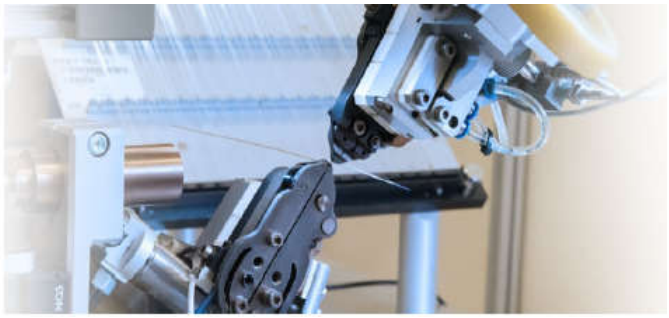

Figure 2.

A textile or polymer fiber is coated with NiTi nanoparticles via electrospinning and then the fiber is removed to produce a hollow wire for orthodontic purposes. Nanotechnology provides the fabrication of new systems that can be incorporated into an active anti-infective part of the periodontal treatment by using nano delivery systems such as NPs, colloidal carriers or liposomes that could breach the hydrophobic barrier of oral biofilm and better penetrate inflamed tissues.

Among these materials, NPs were of the biggest interest in recent years due to a small size enabling penetration through junctional epithelium, stability and bioavailability. One thing that remained the same was the struggle to improve implant–bone interconnection quality. The future in orthodontic treatment will benefit enormously through nanotechnology should all the current attempts succeed to its clinical application at a reasonable cost to the orthodontist and patients. The main idea of this paradigm shift is to provide good oral health by introducing new nanomaterials. The introduction of a new era of materials in dentistry will cover all its aspects, such as conservative and esthetic dentistry, prosthodontics, orthodontics surgery and many more.

REFRENCES

Freitas, R.A. 2000. Nanodentistry. *J Am Dent Assoc* 131(11): 1559-1565.

Poosti, M, Ramazanzadeh, B, Zebarjad, M, Javadzadeh, P, Naderinasab, M, et al. 2013. Shear bond strength and antibacterial effects of orthodontic composite containing TiO2 nanoparticles. *Eur J Orthod* 35(5): 676-679.

Enan, E.T., Hammad, S.M. 2013. Microleakage under orthodontic bands cemented with nano-hydroxyapatite-modified glass ionomer. *Angle Orthod* 83(6): 981-986.

Nagpal, A., Kaur, J., Sharma, S., Bansal, B., Sachdev, P. Nanotechnology: the Era Of Molecular Dentistry. *Indian Journal of Dental Sciences.* 2011; 3(5): 80-82.

Batra, P, Mushtaq, A, Mazumder J, Rizvi MS, Miglani R. Nanoparticles and their applications in orthodontics. Adv. Dent. Oral Heal.2(2), 555584 (2016).

Friedman H, Eidelman O, Feldman Y et al. Fabrication of self-lubricating cobalt coatings on metal surfaces. Nanotechnology 18(11),115703 (2007).

****