

Editorial

Nanorobotics in Dentistry: A Revolutionary Leap in Oral Healthcare

Nanorobotics, a subfield of nanotechnology, is rapidly transforming the landscape of modern dentistry. These microscopic devices, typically ranging from 1 to 100 nanometers in size, hold immense potential in diagnosis, treatment, and preventive dental care. With the ability to perform tasks at the cellular and molecular levels, nanorobots promise enhanced precision, reduced invasiveness, and faster recovery times for patients.

One of the most promising applications of nanorobotics in dentistry is targeted drug delivery. Nanorobots can be programmed to navigate through the bloodstream or oral tissues, releasing medication directly at the site of infection or inflammation. This localized approach minimizes side effects and increases drug efficacy. In addition, nanorobots could revolutionize procedures such as root canal treatments, by identifying and eliminating bacteria deep within the canal system with unprecedented accuracy.

In preventive dentistry, nanorobots can be used for continuous oral monitoring. These devices can detect early signs of dental diseases such as caries or periodontitis by sensing biochemical changes in saliva or plaque. Such real-time diagnostics can significantly improve outcomes through early intervention. Moreover, nanorobots could be deployed to perform daily oral hygiene tasks, such as removing plaque or food debris, thereby reducing the incidence of decay and gum disease.

The use of nanorobotics also extends to dental surgery. Nanorobots could assist in precision-guided surgeries, reducing the need for anaesthesia and decreasing tissue trauma. These procedures would result in less postoperative discomfort and faster healing, offering a more patient-friendly experience.

However, the clinical use of nanorobots in dentistry still faces several challenges. Biocompatibility, control mechanisms, ethical considerations, and regulatory approval remain key concerns. Additionally, the high cost of development and integration into current dental practices may limit accessibility in the near term.

Despite these hurdles, the future of nanorobotics in dentistry is undeniably promising. Continued research and collaboration between engineers, biologists, and dental professionals are essential to bring these futuristic innovations into everyday practice. As technological advancements continue, nanorobotics may soon become a standard component of comprehensive dental care.

References

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