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Braces: A Step Towards a Lifetime of Straight Teeth and Improved Oral Health

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Description

Braces are orthodontic appliances used to correct dental misalignment and improve the alignment, function, and appearance of the teeth and jaws. Here are some important points about braces. Braces are primarily used to correct various orthodontic issues, including crowded or crooked teeth, gaps between teeth, overbites, underbites, crossbites, and other malocclusions (improper bites). Made of high-grade stainless steel, these are the most common type of braces and consist of metal brackets and wires. Similar to metal braces, but the brackets are made of tooth-colored or clear ceramic material, making them less noticeable.

Custom-made braces that are attached to the back (lingual) surface of the teeth, making them virtually invisible from the front. A series of clear, removable aligners (such as Invisalign) that gradually move the teeth into the desired position. The orthodontic treatment process with braces typically involves the following steps. An orthodontist assesses the dental condition, takes X-rays, impressions, and photographs to create a customized treatment plan. Brackets are bonded to the teeth using dental adhesive, and arch-wires are attached to the brackets. Regular follow-up visits are scheduled for adjustments, where the orthodontist tightens or changes the wires to guide tooth movement. After the active treatment, a retainer is often used to maintain the new tooth alignment and prevent relapse. The duration of braces treatment varies depending on the complexity of the orthodontic issues and the individual's response to treatment. Typically, treatment can last from several months to a few years.

Orthodontic Issues

Proper oral hygiene is crucial during braces treatment to prevent tooth decay and gum problems. Extra care is needed to clean around the brackets and wires, and special orthodontic tools may be recommended, such as interdental brushes or floss threaders. During braces treatment, certain dietary restrictions may be advised to protect the braces and prevent damage. Avoiding sticky, hard, or chewy foods and minimizing habits like nail-biting or chewing on pens can help maintain braces integrity. Braces not only improve the alignment and aesthetics of the teeth but also contribute to better oral health. Well-aligned teeth are easier to clean, reducing the risk of tooth decay, gum disease, and other oral health problems. Braces can have a positive impact on self-esteem and confidence, as they help individuals achieve a straighter and more attractive smile. Orthodontic treatment with braces requires the expertise of an orthodontist who specializes in correcting dental misalignment. They will guide and monitor the progress throughout the treatment journey, ensuring the best possible outcome for a beautifully aligned smile.

Dental caries is one of the most common bacteria-related oral diseases, and the cariogenic bacteria play critical roles in its pathogenesis. Antibacterial therapy is regarded as an important approach for treating dental caries. However, the low local drug concentration and the potential generation of drug resistance limit the traditional antibacterial efficacy. Nanomaterials, such as polymeric nanoparticles and liposomes, have been widely used as functional carriers for drug delivery. The antibiotic-loaded nanomaterials have shown great potentials in enhancing the efficacy of antibacterial therapy. In addition, some functionalized nanomaterials, such as metal nanoparticles and graphene-based nanomaterials, can be used as direct antibacterial agents for physical antibacterial therapy, photothermal therapy and photodynamic therapy. Herein, we aim to provide a comprehensive understanding of dental caries and the related pathogenic bacteria, and summarize the recent progress in nanomaterials-based antibacterial treatment. Also, the antibacterial mechanisms and the concerns of nanomaterials in practical use are discussed. The current treatment of caries still relies on the mechanical removal and repair of damaged areas. But such a method is not potent enough for the deep dental caries, and easy to damage the adjacent oral tissues, such as the pulp. Though antibacterial agents, such as Chlorhexidine (CHX) and sodium hypochlorite, are widely used for dental caries therapy, there are many side effects, such as tooth staining, and drug irritation, which create bad experiences for patients. Moreover, drug resistance to traditional antibiotics has become a severe problem. Thus, novel antibacterial approaches should be developed to combat dental caries.

Cariogenic Bacteria

Although many nanomaterials for dental caries treatment have been reported, few of them have finally been used in clinical practice. It seems that there is still a gap between the clinical needs in dentistry and the development of nanomaterials. For example, in the oral environment, an ideal

nanomaterial system should not only focus on the antibacterial efficiency, but also maintain a balance with the original dental flora and biosafety. Because Type I is abundant in dentin and the pH decreases during dental decay, this finding became significant to the field of stomatology. who found that the ability to recognize and bind collagen type I is ubiquitous among oral Lactobacillus spp. strains and it can help them adhere to the collagen-rich cementum as well as dentin if the cementum or enamel layer is absent. Nano-based drug delivery systems have shown promise for antibacterial applications. As carriers for many different agents, nano-based drug systems are good candidates for cariogenic bacteria treatment or biofilm inhibition and remineralization. Given their properties, these multifunctional nano-based drug delivery systems can act as tools for dental caries prevention and early caries treatment, as well as possible secondary caries reduction. Here, three types of nano-based drug delivery systems for anticaries application are analyzed, including metal and metal-oxide nanocarriers, polymeric nanocarriers and small organic molecule-based nanocarriers. As the basic structure of dental hard tissue, Hydroxyapatite (HA) is a calcium ion-related crystal. It can also be an excellent nano-carrier. Owing largely to the biomimetic design and release of calcium and phosphorus ions, amorphous calcium phosphate Nanoparticles (NACPs) have considerable potential for remineralization promotion. In summary, the development of material science and physical chemistry techniques has enabled advancements in nanotechnology that can improve dental caries treatment. However, the current understanding of dental caries pathogenesis and nanomaterial antibacterial mechanisms, particularly regarding the basic mechanisms and applications and biosafety, is inadequate.