Chapter 2

BIOACTIVE MATERIALS IN RESTORATIVE DENTISTRY

Ferda KARABAY [1]

INTRODUCTION

Dentistry's evolution has been shaped by advances in knowledge and technology. Initially, dental treatments focused on pain relief, such as using cloves or extractions. Over time, fillings or prostheses were developed to improve or restore tooth function, with the choice of materials influenced by convenience, tradition, and evolving technology. Modern dentistry emphasizes materials that mimic the appearance of natural teeth, known as "aesthetic" dentistry. However, these materials still have limitations. There's interest in "smart" materials that can self-seal or self-repair, but they only react when externally triggered.

At this point, the definition of a naturally occurring 'bioactive' material has emerged that is part of a normal biological process and serves to trigger or modulate a biochemical pathway. There is significant interest in the use of "bioactive" materials for restorative and reconstructive purposes in contemporary dentistry. This terminology is increasingly taking place in the manuals, brochures, and marketing of the materials and also the perception created by it is quite positive. However, it must be noted that the perception of what is truly considered "bioactive" varies depending on the application. The present inquiry seeks to elucidate the precise definition of the term 'bioactive' and its implications for restorative materials.

DEFINITION AND DEVELOPMENT OF 'BIO' TERMS

The etymology of the prefix bio- can be attributed back to the Greek word "bios," which signifies life. This prefix is commonly associated with a positive sense, frequently denoting a "good life" (1). "Biomaterials", as defined by the American National Institute of Health, are substances that can augment or replace body

[1] DDS, Department of Restorative Dentistry, Faculty of Dentistry, Istanbul Medeniyet University, email: ferdagecgel@hotmail.com, ORCID iD: 0000-0002-6894-5807

with amorphous calcium phosphate (NACP) nanoparticles increases the pH of biofilms and that the adhesive bond with dentin remains stable for long periods. Also, the addition of NACP leads to the release of calcium and phosphate ions (123).

CONCLUSION

Bioactive materials stand at the forefront of medical innovation, bridging the gap between synthetic constructs and natural biological processes. These materials are meticulously crafted to not only replace or augment body tissues but also to actively engage with them, fostering an environment conducive to healing and regeneration. Their evolution, from the rudimentary use of materials like gold in ancient times to the sophisticated "smart" materials of today, underscores the tremendous strides made in the field. As science continues to unravel the intricacies of cellular interactions and tissue regeneration, bioactive materials are poised to become even more refined and tailored. Their adaptability, responsiveness, and ability to mimic natural structures make them invaluable assets in modern medicine, promising improved outcomes and enhanced quality of life for patients.

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