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3D PRINTING IN THERAPEUTIC DENTISTRY

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Three-dimensional (3D) printing, also known as rapid prototyping (RP) or additive manufacturing (AM) including actual layer addition of a material to product an object with helping computer-aided designs and computer-aided manufacturing (CAD/CAM) technology or with enhanced imaging technologies such as CBCT, MRI.

The novel digital technology can provide a wide range of advantages in manufacturing an individualized object in compare with conventional dentistry methods. 3D printing has sparked considerable interest in therapeutic dentistry, specially in endodontics. This sort of technology has a wide scope of applications in researches, patient cares, endodontic education and dental restoration. In this case, 3D printing leads an accurate diagnosis, simple and effective treatment exactly measuring size of object, significantly recording.

Nowadays multiple 3D printing methods can be observed including Stereolithography (SLA), Inkjet based system, selective laser sintering (SLM), Fused deposition modeling (FDM), Material Jetting (MJ), Binder Jetting, Digital light processing (DLP), Dust-based, which prepare rapid prototyping. According to bibliographic search in PUBMED database (pubmed.gov), which collected 75 studies published from 2000 to 2020, SLA, MJ, Binder jetting, Laser sintering, Dust-based are commonly utilized in dental field. However, each of these methods has its specific advantages and disadvantages based on material selection, cost per part, accuracy, resolution of substances and etc. One of the significant advantages in dental field about 3D printing is using various materials such as polymer, resin, metal, ceramic, even stem cells and so on.

In this world of technologies, 3D bioprinting uses CAD blueprints to manufacture complex tissue models, such as pulp and periodontal tissue. The principle is delivering pulp scaffolds, stem cells, injectable calcium phosphates, and growth factors. This sort of technology maximize potential of therapeutic dentistry and increase patients' care. 3D bioprinting opens a huge innovation window in many fields such as therapeutic dentistry in most frequent diseases like periodontitis, pulpitis and loss of alveolar bone.

The aim of this science work is to introduce 3D printing and get familiar with techniques, used up materials in structure and current applications of 3D printing in therapeutic dentistry.