Chapter 10
Fabrication of Dental Implants Using MIMICS Software

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ABSTRACT

The major problem while treating the tumor is that each responds differently to drug therapies. 3D printing is an aid to solve the difficulty faced in radiation therapy that enables personalized treatment by creating mimic models with micro information to facilitate complex therapies like implanting and tumor structural analysis. The data from modern imaging modalities are combined to construct the 3D structure. In the chapter, 3D construction is done with MIMICS software, and the printing is done with Ultimaker 3 ext to produce the vitro implant model as a reference for pre-operative planning and allows the creation of patient-specific models.

INTRODUCTION

Cancer is found to be a second deadly disease in the world, and it is predicted new cases likely to increases by 70% by the next two decades. Thus, the development of a rigorous framework is required for early detection and planning therapies with less adverse effects on the patients. The heterogeneity nature of Tumor is the major problem in cancer treatment response for the drugs varies from person to person. Prototyping or 3D printing lets fabricate the 3D models of the desired region through computer-generated designs helps in personalized treatment planning (Daniel, 2011). The medical image prototyping was introduced in 1980 in japan. In recent, the construction of vitro models resolves difficulties faced in therapeutic planning.

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The present work develops implant for oral cancer treatment. Oral cancer is developed in mouth, tongue, lips, and throat tissues early detection lets key to surviving the pathology disease. Treatment includes surgery and radiation therapy. The surgeon removes the affected tumor region and margin of a few surrounding healthy tissues in case of tumors with big size requires removal of jawbones. Requires reconstructive surgery to rebuild jaws to regain the regular involuntary movements. The medical practitioner transplants some part of bone and skin muscle from other body parts. Dental implants are also used to reconstruct the mouth after surgery. The present work involves mimics software for segmentation of ROI from medical imaging modalities CT and MRI image slices for 3D construction. The 3D model is printed; it aids reference for surgery planning and making implants. The work is done in SASTRA University, Thanjavur. Trichy Medical College; Trichy validate it, and it is used for treating patients.

Challenges in Bioprinting

Unique 3D anatomy of the specimen is constructed through Mimics software from images obtained through CT image slices. Masks of cortical bones and teeth are built through thresholding, and morphological operates from inbuild operations. The surface model of the selected bone is constructed with tetrahedral mesh.