

3D printed antibacterial prostheses

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The purpose of the current investigation was two-fold: (i) to describe the development of 3D printed prostheses using antibacterial filaments and (ii) to verify the antibacterial properties of the 3D printed prostheses. Three-dimensional printed finger prostheses were manufactured using PLACTIVE? antibacterial 3D printing filaments. Two adults with left index finger amputations at the proximal phalanx were fitted with a customized 3D printed finger prosthesis manufactured with an antibacterial filament. The manual gross dexterity was assessed during the Box and Block Test. Patient satisfaction was assessed using the Quebec User Evaluation of Satisfaction with assistive Technology (QUEST 2.0). Bacterial analysis of the 3D printed prostheses was performed by two independent laboratories against *Staphylococcus aureus* and *Escherichia coli* (ISO 22196). Two customized 3D printed partial finger prostheses were manufactured using a 3D printed antibacterial filament. The bacterial analysis showed that PLACTIVE? with 1% antibacterial nanoparticles additives was up to 99.99% effective against *Staphylococcus aureus* and *Escherichia coli*. The manual gross dexterity assessed was improved after using the 3D printed partial finger prosthesis. The research subjects indicated that they were "quite satisfied" to "very satisfied" with the 3D printed partial finger prosthesis. The present investigation showed that the antibacterial 3D printed filament can be used for the development of functional and effective antibacterial finger prostheses. © 2018 by the authors.

3D printing filament

Additive manufacturing

Antimicrobial material

Biocompatible material

Orthoses

Prosthetic design

Rapid prototyping

