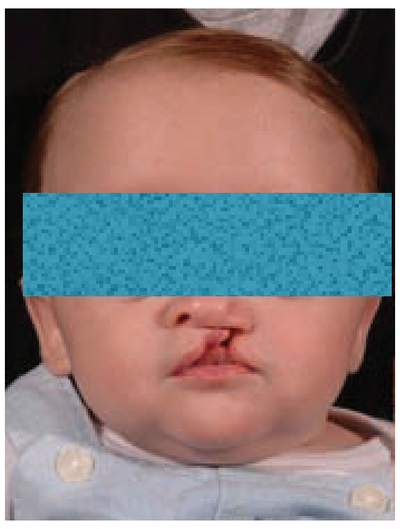
3D PRINTING OF CUSTOMIZED IMPLANTS FOR CLEFT LIP, PALATE AND OROFACIAL DEFORMITIES AND DEFECTS

DEVELOP A METHOD THAT PRODUCES A CUSTOMIZED 3D PRINTED SCAFFOLD TO BE USED IN ALVEOLAR CLEFT SURGERY.



The proposed research will focus on fabrication and testing of novel 3D-printed bioactive constructs for prototype development of patient specific apparatus for alveolar cleft surgery. This in vitro demonstration can be used as a proof of concept to show the feasibility of the process for future in vivo examinations. We hypothesize that bioactive 3D printing can offer the promising potential of patient specific treatment for cleft alveolar palate.

MILESTONES

1. **YEAR ONE**: Printing of basic construct using polycaprolactone (PCL), polylactic acid (PLA) and halloysite nanotubes (HNTs).
2. **YEAR TWO**: 3D printing a patient specific construct using PCL, PLA and HNTs
3. **YEAR THREE**: In vitro biocompatibility analysis of the 3D printed construct using mesenchymal stem cells

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ABOUT OUR TEAM

Lobat Tayebi, PI
Gerard Bradley, Co-PI
David Mills, Co-PI

Dr. Lobat Tayebi, Associate Professor and Director of Research at MUSoD: She will have the primary leadership and responsibility for the scientific and financial integrity of this project. She will facilitate effective collaboration and communication among the PIs to achieve the final goal of the project.

Dr. T. Gerard Bradley, Professor, orthodontist and Associate Dean of Research at Marquette School of Dentistry: He will provide models of previously treated cleft cases and these will be used as templates for the design and fabrication of a new generation of 3D printed construct that will be tested and evaluated for their customized fit.

Dr. David Mills, Professor of Biological Sciences and Biomedical Engineering at louisiana Tech: His group was the first in the world to 3D print absorbable antibiotic beads, chemotherapeutic eluting stents or customized catheters. His expertise is required for printing and loading of the 3D printed construct.

BEYOND BOUNDARIES
Research in Action

The approach described in this proposal will foster the spirit of interdisciplinary research, innovation and entrepreneurship as described in Marquette's mission, and will also boost Marquette's national research reputation as described in the strategic plan.

MU places strong emphasis on collaborative research and scholarship and this project will establish strong linkages with Louisiana Tech, a pioneer in biomedical 3D printing. It will embody research, innovation, and entrepreneurship that should fundamentally change the treatment of orofacial development defects and encourage growth in the area of great research potential. It will advance the University's goal of receiving a "High Research Activity" Carnegie Research Classification.

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Health and Well-being