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degree acquisition protocol in its ability to detect and measure simulated facial fractures.

Statement of Ethical Review
Ethical Review or exemption was not warranted for this study

EFFECTS OF IONIZING RADIATION IN THE DIAGNOSTIC AND THERAPEUTIC RANGE ON THE BIOPHYSICAL PROPERTIES OF COLLAGEN FIBRILS. Dr. Kester Ng, Mr. Nader Allam, Prof. Ernest WN Lam, Prof. Alex Vitkin, and Prof. Laurent Bozec, University of Toronto

Background: Ionizing radiation may indiscriminately and adversely affect tissues during exposure. As collagen is the most abundant protein in the human body, its exposure to ionizing radiation is inevitable. To date, there has been limited comprehensive evaluation of the biophysical properties of individual collagen fibrils exposed to clinically relevant doses of ionizing radiation.

Objective: To assess the effects of ionizing radiation at diagnostic and therapeutic levels on the biophysical properties of collagen at the nanoscale.

Study Design: In vitro acellular type I collagen scaffolds (rat tail origin) were irradiated at two relevant dose levels (diagnostic regime D = 50 μGy and therapeutic regime D = 70 Gy (single fraction)) in hydrated and dehydrated states. Alterations in the biophysical properties of these scaffolds were assessed using atomic force microscopy (AFM) (imaging, nanoindentation) and attenuated total reflectance Fourier-transform infrared (ATR-FTIR) spectroscopy.

Results: Preliminary analysis demonstrated changes in Young’s modulus for all samples treated with both diagnostic and therapeutic dose levels, suggesting the presence of internal crosslinking modifications. These hypothesized changes will be further evaluated by fluorescence-lifetime imaging microscopy (FLIM) and dielectric analysis. No changes were detected in the infrared spectrum, suggesting no denaturation of the protein structure. A neural network for texture analysis is in development for AFM image processing and dose correlation quantification.

Conclusion: In this exploratory project, we demonstrated that diagnostic and therapeutic levels of radiation can alter Young’s modulus of individual collagen fibers. Evaluation of irradiated collagen changes may prove important in managing oral diseases such as squamous cell carcinoma and radiation-induced mucositis and caries. Additional imaging and image processing studies are ongoing to further characterize the response of collagen to radiation.

Statement of Ethical Review
Ethical Review or exemption was not warranted for this study

3D-PRINTED MODEL FOR PRECLINICAL TRAINING IN ORAL AND MAXILLOFACIAL RADIOLOGY
Dr. Vinicius Dutra,a Dr. Gabriela Liedke,b Ms. Alyssa Zhao,a Mr. Wislem Mello,b and Mr. Alec Weiss,a b Indiana University School of Dentistry, and b Universidade Federal de Santa Maria

Objective: 3D printing is experiencing significant growth in the teaching and learning process. Therefore, this study aimed to present a 3D-printed skull model for preclinical intraoral radiographic practice.

Study Design: Two 3D-printed mannequins were created. The first was created using an STL file of a skull and was edited using two 3D modeling softwares (Meshmixer and Netfabb). The second mannequin was designed directly from segmentation of a patient’s CBCT data and then converted into an STL file. Both mannequins were printed using fused deposition modeling (FDM) technology and polylactic acid (PLA) filament. The printed skull bones were attached, and the mandible was articulated to the articular fossa of the temporal bone. The teeth were inserted into the alveoli. Intraoral radiographs of both mannequins were acquired using a digital sensor (Carestream RVG 5100).

Results: Both 3D-printed mannequins showed satisfactory radiographic appearance, allowing geometric representation of each intraoral radiographic projection, regardless of STL file origin. Anatomical structures, such as the periodontal ligament space, zygomatic process of the maxilla, and intermaxillary suture, were represented. The material cost of the printed prototype was $34.00.

Conclusions: The use of 3D-printed models is presented as an alternative to artificial commercial phantoms for the preclinical training of intraoral radiographic techniques, combining the radiographic projection’s quality, the possibility of model manipulation, and an affordable price.

Statement of Ethical Review
Ethical review was sought and study was exempted from ethical review

INCIDENTAL FINDINGS IN THE TEMPORAL REGION: A CBCT STUDY Dr. Jyoti Mago, University of Iowa