product and staff doses, for each procedure and staff group. A risk assessment including the maximum permissible workloads for CA, CC and DCG procedures were derived on the basis of compliance with eye lens dose, skin and effective dose limits.

Summary: Depending on staff occupation in regards to the beam, the occupational dose was higher for physicians and lower for nurses and radiology technologists. The levels of occupational exposure vary considerably with the type of angiography procedure, staff positioning, and the radiation protection equipment used. The data presented for accurate estimation of the occupational dose to staff and design adequate protective measures for the personnel.

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PP32.10
INTEGRATION OF ARTIFICIAL INTELLIGENCE AND ADDITIVE MANUFACTURING IN DOSIMETRY

D. A. Urbina Leal[1], A. C. Koka de Souza Silva[1], I. M. Moitinho Amaral Medeiros[1], A. L. Burin[1], C. Talacimon[1], C. Daruich de Souza[1], G. Martins Rosa[1], L. E. H. Teodoro[1], L. Verdi Angeloci[1], P. Rodrigues[1], S. Sgrignoli[1], M. E. Rostelato[1], C. A. Zeituni[1]

[1] *Nuclear and Energy Research Institute (IPEN/CNEN), Radiations Technology Center, São Paulo, Brazil*

Introduction: Additive Manufacturing (AM), also known as 3D printing, has rapidly integrated into Industry 4.0. It involves layer-by-layer fusion and deposition, creating high-quality prototypes or components of various materials with complex geometries, driven by computer models and Artificial Intelligence (AI) technologies [1–3]. AI represents a significant advancement, enabling scientists to train machines to mimic human abilities like discernment, prediction, and representation of statistically significant phenomena. AM has finds aplication in biomedical engineering, including dosimetry [4,5]. This study aims to develop an AI system and AM process for creating LiF dosimeter enclosures using a 3D FDM printer with PLA material.

Materials & Methods: Prototype development begins with computational modeling and AI programs to design LiF dosimeter enclosures. Parameters for additive manufacturing are then determined. Use a conventional FDM 3D printer and the PLA material to fabricate the prototypes. Lastly, analyses will evaluate the dimensional accuracy and the mechanical and metallurgical properties.

Results: Utilizing AI systems and AM, it can efficiently build encapsulation prototypes of LiF dosimeters for cancer treatment, having careful control over all stages and meeting necessary mechanical and metallurgical property requirements.

Summary: This study shows the important integration of artificial intelligence and additive manufacturing systems to fabricate prototypes of LiF dosimeter packaging for cancer treatments, using FDM 3D printing technologies and PLA as raw material while considering mechanical and metallurgical requirements.

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References:

[1] Milazzo M., Libonati F. The synergistic Role of Additive Manufacturing and Artificial Intelligence for the Design of New Advanced Intelligent Systems. Advanced Intelligent Systems, 2022
[2] Kiran M.B. Application of Artificial Intelligence in Additive Manufacturing – A Review. IEOM Society International, 2021.
[3] Shende P., Agrawal S. Integration of 3D printing with dosage forms: A new perspective for modern healthcare. *Biomedicine & Pharmacotherapy*, 2018.
[4] Wang Y.B. Smart additive manufacturing: Current artificial intelligence- enabled methods and future perspectives. *Sci China Tech*, 2020.
[5] Wendo K., Olszewski R. 3D printing and urology: Review of the clinical applications. *Ukrain Journal of Nephrology and Dialysis* (2020).

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CUMULATIVE EFFECTIVE DOSE (CED) IN PATIENTS WITH CARDIOVASCULAR DISEASES UNDERGOING MULTIPLE RADIOLOGICAL PROCEDURES

D. C. Babosa de Souza[1], A. P. Viero[1], C. Tretto Lemes Pereira Dutra[1], G. Lopes Weis[2], P. Roberto Oliveira de Jesus[2], F. Agustina Perez Gutierrez[1], M. Araquem Scopel[1]

[1] *Federal Institute of Education, Science and Technology of Santa Catarina, Academic Department of Health and Services, Florianopolis, Brazil*
[2] *University Hospital of Santa Maria, Santa Maria, Brazil*

Introduction: Cardiovascular diseases are one of the main causes of death in the world [1]. This study aimed to assess the cumulative effective dose (CED) received by patients with cardiovascular diseases, undergoing multiple diagnostic and therapeutic procedures in a public hospital in the southern region of Brazil [2,3].

Materials & Methods: Data from 658 radiological procedures on 378 cardiovascular disease patients at a participating service from 2022 to 2023, were collected. Inclusion criteria involved patients aged 18–90, both sexes, who underwent exams at public hospitals with clinical indications of cardiovascular disease (CVD). The study was approved by the Ethics Committee.

Results: The study assessed radiation exposure in 378 patients through 658 exams, predominantly male (60.3%) with mean age 71 years. Sixty-three exam types were identified, averaging 2.04 exams per patient. Common exams included coronary angiography (n = 208), PTCA (n = 86), and MPI (n = 82). Clinical indications primarily focused on cardiac and cerebrovascular conditions, with AMI (I21.9) and angina pectoris (I20) being frequent. The average effective dose (E) was 17 ± 22 mSv, with PTCA having the highest (312 mSv). The average CED was 27 ± 35 mSv, with most patients receiving CED≤15 mSv. However, 5.03% received CED≥100 mSv, with 42.10% exceeding 150 mSv. The average dose for patients with exposure over 100 mSv was 154 ± 53