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A Team Learning Initiative in Undergraduate Medical Physics

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PO-GePV-E-06, A Team Learning Initiative in Undergraduate Medical Physics: B Loughery[1*], J McBrady[2], M Joiner[3],(1) Beaumont Hospital, Dearborn, MI, (2) State University Of New York, Cortland, NY, (3) Wayne State University, Detroit, MI

Purpose: To improve comprehension in traditionally difficult subjects for a senior-level undergraduate medical physics course, we designed and implemented a Team Learning technique. This work evaluates the translation of Team Learning to medical physics. **Methods:** At the beginning of the term, students were sorted into 3 even teams (students/year = 14.5). The class met twice weekly: a traditional lecture was taught first, and each team was assigned a specific 1/3 of the lecture material in which to specialize. Each team was assigned to create a PowerPoint presentation on their material using outside references and without copying the original figures or exact wording. Office hours between class meetings were dedicated to aiding the students, and presentations were due, graded, and returned that evening along with the opportunity to resubmit by the second meeting for full marks. At the second meeting, teams were divided and sorted into pods of 3 with one representative from each team in each pod. The pods taught one another their material with the goal of improving comprehension and exam scores. Two years of pre-intervention and 2 years of post-intervention exam grades were collected. Exam questions on the subjects were kept constant so that the impact of this change could be evaluated. **Results:** Grades improved in both experimental sections, from an average of 0.5 to 0.3 incorrect answers ($p < 0.1$) per student in the MRI section, and from 1.3 to 0.5 ($p < 0.1$) in the Radiation Safety section. Grades were not significantly changed ($p > 0.1$) in the practice section on X-Ray Production. **Conclusion:** The Team Learning approach translated well into undergraduate medical physics. Exam scores improved in 2 difficult subjects alongside good qualitative feedback. We will continue to provide this in the course in the coming years, with an eye toward expanding to graduate-level courses.

PO-GePV-E-07, A Multi-Modal Deep Learning-Based Decision Support System for Individualized Radiotherapy of Non-Small Cell Lung Cancer: A Niecikowski[1*], S Gupta[2], G Suarez[3], J Kim[4], H Chen[5], F Guo[6], W Long[7], J Deng[8],(1) Yale University, New Haven, CT (2) Delhi Technological University, India, (3) University of Puerto Rico, Mayaguez, Puerto Rico, (4) Yale University, New Haven, CT (5) Yale New Haven Hospital, New Haven, CT, (6) Yale New Haven Hospital, New Haven, CT, (7) Yale University School of Medicine, New Haven, CT, (8) Yale University School of Medicine, New Haven, CT

Purpose: In cancer, interactions between the tumor and host can exist in multiple modalities across scales such as clinical, genomic, molecular, pathological, and radiological imaging, which poses a challenge to clinicians in making treatment decisions. AI can explore potential care paths to generate the best treatment option for a patient while maximizing benefits and minimizing toxicities. In this work, we aim to develop a multi-modal, AI-empowered, clinical decision support system for personalized radiotherapy of non-small cell lung cancer patients**. Methods:** With IRB approval, data of 217 non-small cell lung cancer patients was obtained, which included treatment planning data, images, and clinical notes. Treatment planning factors were focused on clinical, demographic, and dose-volume indexes, radiomic features were extracted using 3D Slicer, and the clinical notes were analyzed using natural language processing. Patient toxicities were ranked on a RTOG scale of 0-5 on radiation pneumonitis severity, while the outcomes were ranked on from 0-3 based on tumor reduction over 3 years per RECIST 1.1 guidelines. The consolidated data was input into a deep neural network with five hidden layers. Using 5-fold cross validation testing, an optimal set of weights was determined. **Results:** The accuracy of the model was 89.4% for predicting whether radiation pneumonitis was severe (RTOG >=2) and was 71.0% in predicting whether the treatment was successful after 3 years. This approach was superior to traditional approaches focusing on a single datatype. The model performed well with up to 5% of the training data missing, reflecting real clinical challenges. **Conclusion:** In this work, we've developed a multi-modality-based decision support system for radiation therapy and demonstrated its efficacy in predicting radiation-induced pneumonitis and patient outcome. Future work will be on automating the curation of patient data to achieve adaptive personalized radiotherapy for more robust clinical decision support in the clinic.

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PO-GePV-E-08, Strategies to Increase Data Science and Artificial Intelligence Curriculum and Practical Skills in Medical Physics Graduate and Residency Programs: R McBeth*, T Li, S O'Reilly, University of Pennsylvania, Philadelphia, PA

Purpose: To discuss the importance, strategy, and tools for including data science (DS) and artificial intelligence (AI) training in graduate and postgraduate medical physics programs. **Methods:** The fields of DS and AI are growing rapidly and have massive implications for the future practice of medicine. Medical physicists have a unique position in healthcare and have made significant contributions to technological innovations. Physicists' ability to effectively communicate in medicine, utilize their technical skills to create clinical software, and conduct research positions them to contribute to the integration of AI into clinical practice but well defined AI curriculum needs to be defined. The current status of DS and AI education was surveyed by exploring published journal articles, graduate and residency program websites, online education platforms, coding repositories, and discussions with current graduate students and