Rochester, MN. We will be able to track changes in risk factors over time and work to enhance screening protocols to target the most vulnerable populations.

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Evaluating defective Transcription Coupled-Nucleotide Excision Repair as a mechanism for sensorineural hearing loss in a zebrafish model of Cockayne Syndrome

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OBJECTIVES/GOALS: The characterization of the zebrafish as an animal model for Cockayne Syndrome may guide us towards role of Transcription-Coupled Nucleotide Excision Repair (TC-NER) defects in sensorineural hearing loss. METHODS/STUDY POPULATION: To examine our model, we have developed a zebrafish line with a 9+1 base-pair deletion in the ercc6 gene using TALENs. Mutation has since been confirmed by PCR and subsequent restriction digest with StuI. A series of assays evaluating hair cell morphology, structure and function, as well as ribbon synapse structure, will be used to analyze potential differences between the ercc6 mutant zebrafish line a their wild-type siblings. Additionally, electron microscopy will be used to assess differences in hair cell ultrastructure between the ercc6 mutant zebrafish line a their wild-type siblings. Finally, UVC exposure assays will be used to determine the role TC-NER plays in our novel zebrafish model, and evaluate its potential implications in sensorineural hearing loss. RESULTS/ANTICIPATED RESULTS: We anticipate that biallelic loss of function mutations in the zebrafish ercc6 gene will result in abnormalities in hair cell structure, mechanotransduction, or cell number. Additionally, we anticipate that hair cell ultrastructure and ribbon synapse structure will be impacted by loss of ercc6 expression. DISCUSSION/SIGNIFICANCE: Hearing loss mechanisms associated with defects in TC-NER are yet to be described. We believe our model will provide the tools for a faster and efficient way to carry out Cockayne Syndrome studies while laying the groundwork for the association between TC-NER and hearing loss.

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Ionizing radiation acoustic imaging (iRAI) for volumetric mapping the dose deep in the liver during radiation therapy

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OBJECTIVES/GOALS: The goal of this study was to develop a clinically applicable technique to increase the precision of in vivo dose monitoring during radiation therapy by mapping the dose deposition and resolving the temporal dose accumulation while the treatment is being delivered in real time. METHODS/STUDY POPULATION: Ironizing radiation acoustic imaging (iRAI) is a novel imaging concept with the potential to map the delivered radiation dose on anatomic structure in real time during external beam radiation therapy without interrupting the clinical workflow. The iRAI system consisted of a custom-designed two-dimensional (2D) matrix transducer array with integrated preamplifier array, driven by a clinic-ready ultrasound imaging platform. The feasibility of iRAI volumetric imaging in mapping dose delivery and real-time monitoring of temporal dose accumulation in a clinical treatment plan were investigated with a phantom, a rabbit model, and a cancer patient. RESULTS/ANTICIPATED RESULTS: The total dose deposition and temporal dose accumulation in 3D space of a clinical C-shape treatment plan in a targeted region were first imaged and optimized in a phantom. Then, semi-quantitative iRAI measurements were achieved in an in vivo rabbit model. Finally, for the first time, real-time visualization of radiation dose delivered deep in a patient with liver metastases was performed with a clinical linear accelerator. These studies demonstrate the potential of iRAI to monitor and quantify the radiation dose deposition during treatment. DISCUSSION/SIGNIFICANCE: Described here is the pioneering role of an iRAI system in mapping the 3D radiation dose deposition of a complex clinical radiotherapy treatment plan. iRAI offers a cost-effective and practical solution for real-time visualization of 3D radiation dose delivery, potentially leading to personalized radiotherapy with optimal efficacy and safety.

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Novel approach for tracking interdisciplinary research productivity using institutional databases

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OBJECTIVES/GOALS: This study proposes a pragmatic approach for tracking institutional changes in research teamwork and productivity in real time using common institutional electronic databases such as eCV and grant management systems. Dissemination of this approach could provide a standard metric for comparing teamwork productivity across different programs. METHODS/STUDY POPULATION: This study tracks research teamwork and productivity using commonly available institutional electronic databases such as eCV and grant management systems. We tested several definitions of interdisciplinary collaborations based on number of collaborations and their fields of discipline. Publication characteristics were compared by faculty seniority and appointment type using non-parametric Wilcoxon Rank Sum Test (p RESULTS/ANTICIPATED RESULTS: Interdisciplinary grants constitute 24% of all grants but the trend has significantly increased over the last five years. Tenure track faculty collaborated with more organizations (3.5, SD 2.5 vs 2.3, SD 1.1, p DISCUSSION/SIGNIFICANCE: This study provides empirical evidence of the benefits of interdisciplinary collaboration in research and identifies an important role that senior faculty may be playing in creating the culture of interdisciplinary teamwork. More research is needed to improve efficiency of interdisciplinary collaborations.

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