phospho-proteomic signature in FGFR-altered cancers to identify new candidates for FGFR-targeted therapies. METHODS/STUDY POPULATION: In our preliminary study, we have curated a cohort of FGFR2 mutants (13 FGFR2-fusions and 4 FGFR2 point mutations) with known clinical outcomes to FGFR inhibitors and 8 FGFR2 wild-type (WT) cholangiocarcinoma tumor samples to investigate the phospho-proteomic fingerprint using a clinical grade reverse phase protein array (RPPA). RPPAs are high throughput quantitative antibody-based proteomics assays that can quantify hundreds of proteins in thousands of patient tissues providing a high degree of sensitivity through laser tumor microdissection (LCM). We have selected proteins in the FGFR signaling pathway including FGFR2, AKT, ERK1.2, STAT1/3, FRS2, and PLCg to define the range of phospho-proteomic signal between FGFR2 WT and mutant cancers. All samples will undergo evaluation with RNASeq for gene expression. RESULTS/ANTICIPATED RESULTS: Our initial analysis defined the range of RNA expression of FGFR2 and pFGFR2 protein signal (Y653/654 and Y769) between FGFR2 WT and FGFR2 mutant samples. On average, the FGFR2 mutant cohort displayed higher FGFR2 RNA expression compared to the FGFR2 WT cohort. There is no apparent correlation between RNA expression and clinical response to FGFR-targeted therapy. However, in this small cohort, there is no significant difference in FGFR2 phosphorylation between FGFR2 WT and mutant cancers. RPPA analysis of FGFR downstream signaling proteins reveals a wide range of phosphorylation, but no significant difference between FGFR2 WT and mutant cancers. DISCUSSION/SIGNIFICANCE OF IMPACT: These findings illustrate the complexities of FGFR signaling between FGFR2 WT and mutant cancers. These data suggest that tumors with genomically WT FGFR may display increased pFGFR2 and downstream signaling phospho-proteins. We propose a larger study of cholangiocarcinoma to evaluate evidence of FGFR pathway activation in WT tumors.

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AI-driven predictive radiomics: A review of early detection methods for metabolic markers in preventative medicine

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OBJECTIVES/GOALS: This review evaluates recent advancements in artificial intelligence (AI)-driven radiomics for detecting early metabolic and structural changes via imaging techniques like PET-CT and magnetic resonance imaging (MRI). It aims to assess AI's potential to predict disease progression and explore its implications for personalized preventative medicine. METHODS/STUDY POPULATION: This review analyzed studies from the past five years that explored AI applications in radiomics for early disease detection. The studies primarily focused on patients at risk for metabolic, cardiovascular, and oncological diseases. AI algorithms, including deep learning models, were evaluated for their ability to detect subtle metabolic and structural changes in imaging data from modalities like PET-CT and MRI. We categorized methodologies based on imaging biomarkers targeted, AI model architecture, and the clinical populations involved. The review highlights the methods used across studies to assess AI's effectiveness in predicting disease progression. RESULTS/ANTICIPATED RESULTS: The review found that AI models consistently demonstrated superior performance in detecting early metabolic and structural changes compared to traditional radiology methods. Across multiple studies, AI was able to identify biomarkers associated with disease progression months before clinical symptoms appeared, particularly in metabolic, cardiovascular, and cancer patients. Deep learning algorithms showed high accuracy in analyzing imaging data, improving predictive outcomes. The findings suggest that integrating AI into clinical practice could enable earlier interventions, offering personalized preventative care, and reducing the progression of late-stage diseases. DISCUSSION/SIGNIFICANCE OF IMPACT: AI-driven radiomics holds great promise for transforming healthcare by enabling life-saving early detection and precision-based interventions. This technology could significantly reduce mortality in diseases like cancer, heart disease, and diabetes by allowing for earlier, targeted preventative strategies.

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Sonographic assessment of hepatic and pancreatic steatosis in medical student cohort: Evaluating lifestyle-linked metabolic risks

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OBJECTIVES/GOALS: Unhealthy lifestyle habits may increase medical students' risk for metabolic dysfunction-associated fatty liver disease (MAFLD) and non-alcoholic fatty pancreatic disease (NAFPD). This study aims to investigate how these lifestyle factors affect liver and pancreas health in preclinical medical students using diagnostic ultrasound imaging. METHODS/STUDY POPULATION: Using diagnostic ultrasound imaging, we propose a research study to evaluate the anatomical changes of the liver and pancreas associated with lifestyle among medical students in UCC. Forty-two (42) medical students from the Central University of the Caribbean who are in their preclinical years will be recruited to perform an abdominal ultrasound. To measure the diameter of the right liver lobe, we will employ the craniocaudal measurement method established by Riestra. et al. (2018). The parameter established by Rumack et al. (2011) will be utilized to assess liver texture and categories by Lee JS et al. (2009) to pancreas fat infiltration grades. RESULTS/ANTICIPATED RESULTS: This study expects to reveal a significant correlation between the lifestyles of preclinical medical students and the health of their liver and pancreas, particularly in size and texture. We anticipate identifying specific lifestyle factors – such as dietary habits and physical activity levels – that contribute to the prevalence of hepatic and pancreatic steatosis. Additionally, we expect to highlight the need for targeted interventions to promote healthier lifestyles among medical students to mitigate risks associated with MAFLD and NAFPD. DISCUSSION/SIGNIFICANCE OF IMPACT: This study is significant for monitoring changes in liver and pancreas health, preventing complications, and improving health quality while reducing future costs. It may guide the creation of tailored wellness programs for medical students, enhancing their well-being and contributing to better healthcare practices and educational strategies.

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