survival, and immune composition were analyzed by flow cytometry and imaging. Public RNA-seq and clinical datasets were used to assess ADRB2 expression and its prognostic value in AML patients. RESULTS/ANTICIPATED RESULTS: AML induces sympathetic neuropathy in both mouse and human bone marrow. Denervation or Adrb2 loss accelerated AML and reduced survival in immune-competent mice, correlating with decreased $CD8^+$ T cell activity. In contrast, denervation reduced leukemia burden in immunodeficient NSG mice, and β2-adrenergic agonist treatment enhanced AML proliferation *in vitro*. High ADRB2 expression in AML patients predicted worse survival, particularly in M5/MLL-rearranged subtypes. DISCUSSION/SIGNIFICANCE OF IMPACT: Sympathetic signaling exerts dual roles in AML, supporting immune surveillance but directly acting on leukemic cells to promote AML progression. These findings identify β2-adrenergic signaling as a potential therapeutic target, especially in immunodeficient or chemotherapy-treated AML patients.

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Translating research into clinical practice: Pre-implementation assessment of an AI-enabled same-day diagnostic workflow for breast screening*

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OBJECTIVES/GOALS: Asynchronous imaging workflows delay follow-up for abnormal screening mammograms. Real-time artificial intelligence (AI) flags high-risk scans for synchronous, immediate review. We present pre-implementation qualitative and quantitative assessments to inform AI-enabled workflow redesign and improve outcomes. METHODS/STUDY POPULATION: We conducted a workflow study in the largest of 14 breast imaging centers in our health system. A multidisciplinary team of experts in breast imaging, implementation science, and AI/informatics conducted four clinical shadowing visits held on different weekdays (August 2023) and a time-motion study (February 2024) to identify opportunities for optimization in the current breast cancer screening imaging workflows. To determine the optimal time for potential AI workflow integration, we used statistical process control (SPC) charts to visualize patient volumes based on 2022 to 2023 scheduling data. RESULTS/ANTICIPATED RESULTS: The selected site had an average daily patient volume of 67, including 29 screening mammography patients, 3 of whom with abnormal findings prompting a diagnostic workup. During shadowing, observers recorded time stamps for each breast imaging exam step, from check-in to check-out, to calculate exam duration and estimate waiting room capacity for diagnostic and screening mammography or ultrasound. We analyzed workflow to identify unnecessary tasks and radiologists' disruptions that, if changed, could create the space for real-time reading without more difficult changes to workflow, for example, the number of radiologists and their deployment. SPC charts indicated that selected clinic days would be most promising for testing the new real-time workflows without major disruption to the system. DISCUSSION/SIGNIFICANCE OF IMPACT: A detailed understanding of the workflow ensures future implementations achieve intended outcomes. This analysis helped identify modest opportunities in radiologist and staff downtime to support the new workflow, potentially improving satisfaction, reducing anxiety, and shortening time to diagnosis.

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Clinical translation of quantitative ultrasound for nail disease: Bridging imaging biophysics and dermatology

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OBJECTIVES/GOALS: To translate quantitative ultrasound (QUS) from imaging biophysics into clinical dermatology by evaluating its reproducibility, diagnostic differentiation, and potential as a non-invasive, point-of-care tool for nail disease assessment. METHODS/STUDY POPULATION: Diagnosing nail disease is difficult due to overlapping features and the invasiveness of biopsy. In a prospective study (recruitment ongoing), patients with onychomycosis, inflammatory nail disease (psoriasis or lichen planus), and controls underwent 15-MHz ultrasound of fingernails and toenails (n = 26 patients, 152 nails). Raw radio-frequency data were processed to derive three QUS parameters: Homodyned-K [α] (microstructural organization), effective scatterer diameter (ESD) (scatterer size reflecting tissue texture), and effective acoustic concentration (EAC) (scatterer density reflecting compactness). Metrics were analyzed with t-tests and mixed-effects models. Within-patient consistency and parameter reproducibility were evaluated to assess clinical translation feasibility. RESULTS/ANTICIPATED RESULTS: Diseased fingernails (33 vs 54 controls) showed reduced α (−1.11, $p < 0.001$), reflecting loss of microstructural organization. Onychomycosis had the largest change (−1.25), while inflammatory nails were moderately reduced (−0.93). ESD showed opposite trends (+0.85, $p = 0.02$) indicating coarser scatterers in fungal disease, and EAC was uniquely elevated in lichen planus (+1.30, $p < 0.01$), consistent with fibrotic regions. In the toenail cohort (16 diseased vs 49 controls), onychomycosis showed parallel changes (α −0.9, $p < 0.001$; ESD +1.0, $p = 0.02$), supporting reproducibility across nail sites.

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