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“Culturally Tailored Lung Cancer Prevention: Developing an AI Video Pipeline for LDCT-Eligible African Americans”

Background: Lung cancer is the leading cause of cancer mortality in the United States, disproportionately affecting African American populations in incidence and mortality. Although Low-Dose Computed Tomography (LDCT) facilitates early detection, uptake remains hindered by structural barriers, low screening awareness, and medical mistrust. Culturally tailored media improves intervention efficacy, but traditional videography involves significant logistical and financial bottlenecks that limit localized scaling, leading interventions to rely on generic materials lacking cultural resonance.

Objective: To design, implement, and evaluate an accessible generative artificial intelligence (AI) video pipeline producing culturally tailored, locally resonant LDCT health education media for a multilevel interventional trial in New Orleans.

Methods: A three phase reproducible workflow spanning scripting, generation, and validation was developed using accessible multimodal tools, including Google Gemini, Google Veo, and HeyGen. Content was mapped to three media formats. These included still diagrams with voiceovers, talking AI avatars, and more complex cinematic scenes showcasing characters doing specific actions. To prevent algorithmic hallucinations, uncanny visual artifacts, and cultural insensitivity, a continuous human-in-the-loop (HITL) manual framework was integrated. Intermediate outputs were vetted against a standardized validation checklist, followed by expert panel reviews to ensure clinical accuracy, health literacy, and visual fidelity prior to community deployment.

Results: The workflow produced educational video modules featuring recognizable New Orleans backdrops and a diverse cast of black characters of various ages, styling, and body habitus. The pipeline afforded autonomy to rapidly modify scripts, scenes, and avatar delivery without traditional production delays. Meanwhile the HITL protocol successfully intercepted visual flaws and medical inaccuracies prior to final asset compilation while mitigating any potential cultural mishandlings.

Conclusion: This novel AI pipeline provides a feasible alternative to traditional videography for community-based health promotion, providing media that can resonate with participants for a localized study. It grants potential research teams a powerful tool that can potentially increase accessibility of culturally-tailored media in interventions if used responsibly.