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### A pilot randomized controlled trial of precision care for smoking cessation in the Southern Community Cohort Study

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**OBJECTIVES/GOALS:** Precision care may engage smokers and providers in treatment but is understudied in the community. We piloted guideline-based care (GBC) alone or with Respiragene, a lung cancer polygenic risk score (PRS, 1-10), or metabolism-informed choice of medication using the nicotine metabolite ratio (NMR). **METHODS/STUDY POPULATION:** Daily smokers (n = 58) with stored biospecimens in the Southern Community Cohort Study were randomized 1:1:1 to GBC, PRS, or NMR, counseled to quit smoking, and co-selected FDA-approved cessation medication (nicotine replacement, varenicline) with a tobacco counselor. In PRS, precision motivational counseling was guided by PRS (i.e., lung cancer risk 10-40-fold that of never-smokers). In NMR, precision medication recommendations consisted of varenicline for faster metabolizers (NMR $\geq$ 0.31) and nicotine replacement for slow metabolizers (NMR<0.31). Feasibility was defined as achieving at least 50% provider engagement (med prescription) and at least 50% patient engagement (self-reported med use). **RESULTS/ANTICIPATED RESULTS:** Participants were median age 59, 72% female, 81% Black, 60% with incomes <\$15,000; median cigarettes/day was 15 (IQR 8-20) and 52% reported time-to-first cigarette <5 minutes, illustrating moderate nicotine dependence. Providers confirmed medication prescriptions for 40% of patients (32% GBC, 50% PRS, 37% NMR) and 83% of patients reported using medication (prescribed or unprescribed) during the study (90% GBC, 80% PRS, 79% NMR). At 6-month follow-up, 27% (n = 15) reported cessation (39% GBC, 16% PRS, 26% NMR). Among persistent smokers, 46% reported smoking at least 50% fewer cigarettes/day compared to baseline (45% GBC, 38% PRS, 57% NMR). Small sample size precluded statistical comparisons. **DISCUSSION/SIGNIFICANCE OF IMPACT:** Precision interventions to quit smoking are feasible for community smokers, who engaged at high rates. However, only 40% of providers supported patients' quit attempts with medication prescriptions. Future research should test strategies to raise provider engagement in precision smoking treatment. **CONFLICT OF INTEREST DESCRIPTION:** R.F.T. has consulted for Quinn Emmanuel and Apotex on unrelated topics. H.A.T. reported providing input on design for a phase 3 trial of cytosine proposed by Achieve Life Sciences and being a principal investigator of National Institutes of Health-sponsored studies for smoking cessation that include medications donated by the manufacturers. Other authors declare no potential conflicts of interest.

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### Artificial Intelligence-Based Quantification of the General Movement Assessment Using Center of Pressure Patterns in Healthy Infants

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**OBJECTIVES/GOALS:** One in six children in the U.S. has a Neurodevelopmental Disability (NDD). Precht's General

Movement Assessment (GMA) is a qualitative predictor of early motor dysfunction. However, no quantitative biomechanical assessment exists to more accurately identify all patients with NDD. **METHODS/STUDY POPULATION:** With UAMS IRB approval, as part of a larger study, healthy infants were filmed while lying supine on a force plate for 2 minutes. We studied 12 healthy full-term infants (gestational age: 38.9 $\pm$ 1.5 weeks, age: 2.1-7.0 months; 7M, 5F; length: 64.0 $\pm$ 5.2 cm; weight: 7.2 $\pm$ 1.3 kg). Within our data set there were 3 infants transitioning to fidgety period ( $\leq$ 3 months), 4 in the fidgety period, (3-5 months), and 5 that matured beyond fidgety period ( $>$ 5 months). Center of pressure (COP) path-lengths were gathered from the force plate at 1000 Hz. We grouped our data with K-means clustering and performed statistical analysis with ANOVA. **RESULTS/ANTICIPATED RESULTS:** We divided our data into 3 distinct clusters. The first group contained infants with moderate variability of movements which included 2 infants between 3 and 5 months and 2 infants slightly outside of this range. The second group, with mild variability in movements, included 4 infants between 2 and 3 months as well as 2 infants just older than 5 months. The third group, with little variability in movements, included 2 infants older than 5 months. A GMA reader (TJ) qualitatively confirmed these findings with video footage. Using a threshold of p<0.05, data sets within the clusters were similar and significantly different from other clusters. **DISCUSSION/SIGNIFICANCE OF IMPACT:** Fidgety infants have greater variability in COP patterns than their mature counterparts. We anticipate additional COP measurements will correspond with qualitative GMA analyses. Artificial Intelligence-based quantification of the GMA may be useful in earlier detection or prediction of NDD outcomes.

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### Black Bone MRI from the Lab to Clinical Practice: Eliminating Radiation Exposure in Reconstructive Surgery Patients

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**OBJECTIVES/GOALS:** Virtual surgical planning and 3D printing enable streamlined surgeries and increased complexity. These technologies, however, require CT scans and radiation exposure. This project's goal is to optimize and demonstrate the accuracy of Black Bone MRI for surgical planning in reconstructive surgery. **METHODS/STUDY POPULATION:** Four common craniofacial surgeries were planned and performed on cadaver specimens (maxillary advancement, orbital floor reconstruction with patient-specific implants, cranial vault reconstruction, and fibular free flap reconstruction of the mandible). For each surgical procedure, ten cadaver heads were used. Five of each surgery were planned and 3D printed guides were created utilizing Black Bone MRI versus five with CT scans. Following mock surgeries, all specimens underwent a post-operative CT scan. 3d reconstruction was performed and surgical accuracy compared to the plan was assessed using GeoMagic Wrap, assessing average post-operative deviation from plan. **RESULTS/ANTICIPATED RESULTS:** In all surgeries, guides created from Black Bone MRI demonstrated high accuracy to surgical plan. Average osteotomy (cut) deviation from plan was not statistically significantly different when Black Bone MRI was used compared to CT scans