

patterns of brain activation and connectivity of face processing regions. However, small sample sizes and inconsistent results have hindered clinical utility of these findings. The study aims to establish consistent patterns of brain responses to faces in ASD and provide directions for future research. **METHODS/STUDY POPULATION:** Neuroimaging studies were identified through a multi-database search according to PRISMA guidelines. In total, 23 studies were retained for a sample size of 383 healthy controls and 345 ASD. Peak coordinates were extracted for activation likelihood estimation (ALE) in GingerALE v2.3.6. Follow-up ALE analyses investigated directed Versus undirected gaze, static Versus dynamic, emotional Versus neutral, and familiar Versus unfamiliar faces. **RESULTS/ANTICIPATED RESULTS:** Faces produced bilateral activation of the fusiform gyrus (FG) in healthy controls ( $-42 -52 -20$ ;  $22 -74 -12$ ,  $p < 0.05$ , FDR) and left FG activation in ASD ( $-42 -54 -16$ ,  $p < 0.05$ , FDR). Activation in both groups was lateral to the mid-fusiform sulcus. Follow-up results pending. **DISCUSSION/SIGNIFICANCE OF IMPACT:** Reduced right FG activation to faces may inform biomarker or response to intervention studies. Mid-fusiform sulcus proved a reliable predictor of functional divides should be investigated on a subject-specific level.

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### Neurophysiological substrates and developmental sequelae of sensory differences in infants at high risk for autism spectrum disorder

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**OBJECTIVES/SPECIFIC AIMS:** Background: Children with autism spectrum disorder (ASD) show a broad range of unusual responses to sensory stimuli and experiences. It has been hypothesized that early differences in sensory responsiveness arise from atypical neural function and produce “cascading effects” on development across a number of domains, impacting social and communication skill, as well as broader development in children affected by ASD. A primary challenge to confirming these hypotheses is that ASD cannot be definitely diagnosed in the earliest stages of development (i.e., infancy). A potential solution is to prospectively follow infants at heightened risk for ASD based on their status as infant siblings of children who are diagnosed. We examined the developmental sequelae and possible neurophysiological substrates of three different patterns of sensory responsiveness—hyporesponsiveness (reduced or absent responding to sensory stimuli) and hyperresponsiveness (exaggerated responding to sensory stimuli), as well as sensory seeking (craving of or fascination with certain sensory experiences). Infants at high risk (HR) for ASD were compared with a control group of infants at relatively lower risk for ASD (LR; siblings of children with typical developmental histories). **Objectives:** Research questions included: (a) Do HR infants differ from LR infants in early sensory responsiveness?, (b) Does sensory responsiveness predict future ASD and related symptomatology? and (c) Is sensory responsiveness predicted by resting brain states? **METHODS/STUDY POPULATION:** Methods: To answer these questions, we carried out a longitudinal correlational investigation in which 20 HR infants and 20 LR controls matched on sex and chronological age were followed over 18 months. At entry to the study, when infants were 18 months old, sensory responsiveness was measured using the Sensory Processing Assessment and the Sensory Experiences Questionnaire, and a number of putative neural signatures of early sensory differences were measured via resting state EEG. When infants were 24 and 36 months of age, ASD and related symptomatology was evaluated in a comprehensive diagnostic evaluation. **RESULTS/ANTICIPATED RESULTS:** Results: HR infants trended towards increased hyporesponsiveness and hyperresponsiveness and showed significantly elevated levels of sensory seeking relative to LR controls at 18 months of age. Both groups, furthermore, displayed a high degree of heterogeneity in sensory responsiveness. Atypical sensory responsiveness (increased hyperresponsiveness and/or hyporesponsiveness, as well as sensory seeking behavior) predicted several aspects of ASD and related symptomatology, including social, communication, and play skill, and was associated with differences in resting brain state, including metrics of oscillatory power, complexity, and connectivity, as well as hemispheric asymmetry. Moderation analyses revealed that several relations varied according to risk group, such that associations were stronger in magnitude in the HR Versus LR group. **DISCUSSION/SIGNIFICANCE OF IMPACT:** Conclusion: Findings provide empirical support for the notion that early sensory responsiveness may produce cascading effects on development in infants at heightened risk for ASD. Differences in resting brain states may underlie atypical behavioral patterns of sensory responsiveness. From a clinical standpoint, results suggest that early sensory differences may be useful for predicting developmental trajectories, and be potentially important targets for early preventive intervention, in infants at risk for autism.

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### Noninvasive biomarkers for inflammatory bowel disease: Drawbacks and potential

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**OBJECTIVES/SPECIFIC AIMS:** Approximately 1.6 million Americans suffer from inflammatory bowel diseases (IBD), ulcerative colitis, and Crohn’s disease. It is a challenge for both physicians and patients alike to manage the disease, primarily due to lack of disease specific biomarkers. Endoscopy remains the gold standard to diagnose and evaluate IBD activity. Current biomarkers or their combinations cannot adequately predict IBD progression or relapse, and response to therapy. **METHODS/STUDY POPULATION:** In total, 97 IBD patients recruited at University of Kentucky undergoing endoscopy. Patients medical information was collected from electronic database including C-reactive protein (CRP), fecal calprotectin (FC), endoscopy/pathology report. **RESULTS/ANTICIPATED RESULTS:** The mean CRP and FC levels were 1.3 (normal <1) and 679 (normal <162), respectively. FC (sensitivity 74%) was more reliable to predict mucosal inflammation compare to CRP (sensitivity 36%). However, 52% of patients did not have FC performed (vs. CRP only 4%), and 45% of these patients failed to submit stool sample for analysis. **DISCUSSION/SIGNIFICANCE OF IMPACT:** Our data suggests FC is the most promising noninvasive marker for disease monitoring in IBD. It correlates well with endoscopic activity and mucosal inflammation. However, further analysis must be done to evaluate barriers to testing and issues with compliance from patients. We feel strongly that a blood biomarker for disease activity is vital for disease monitoring and response to therapy in IBD.

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### Novel PGF2a synthesis pathway in epithelial ovarian cancer

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**OBJECTIVES/SPECIFIC AIMS:** To understand the role of PGF2a and to characterize a novel cyclooxygenase (COX)-independent prostaglandin synthesis pathway in epithelial ovarian cancer. **METHODS/STUDY POPULATION:** We used high grade epithelial ovarian cancer cell line (OVCAR3) as a model to study our pathway. Our main mode of PGF2a detection is through mass spectrometry. **RESULTS/ANTICIPATED RESULTS:** Our current results suggest the OVCAR3 cells may synthesize PGF2a independently of COX enzymes. We anticipate this novel pathway may be dependent on the TGFb pathway. **DISCUSSION/SIGNIFICANCE OF IMPACT:** Understanding the role and synthesis pathway of PGF2a may allow us to uncover a novel therapeutic pathway for high grade ovarian cancer.

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### Optimizing a technique for visualizing retinal and choroidal blood flow noninvasively

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**OBJECTIVES/SPECIFIC AIMS:** Diabetic retinopathy is an increasingly prevalent disease, difficult to screen for across the globe. We have developed and began optimizing an innovative technique to visualize and quantify retinal blood flow, to elucidate the role of the choroid in retinal pathologies such as diabetic retinopathy or choroidopathy. **METHODS/STUDY POPULATION:** Preliminary retinal was obtained from a surgical retina video library (Truvision, Goleta, CA, USA). Videos of different organs were recorded while vessels were occluded via a blood pressure cuff, using consumer-grade digital video cameras (NEX-5T, a7sii; Sony, New York, NY, USA). All other retinal videos were taken using a fundus camera (50x; Topcon, Oxland, NJ, USA) modified to support the above digital video cameras. All videos were processed using experimental software (MATLAB, Mathworks, Natick, MA, USA). **RESULTS/ANTICIPATED RESULTS:** Video imaging of the retina was optimized for lighting conditions and software requirements. Parameters were defined for the software imaging pipeline, such as frequency range of interest, sampling rate, and noise minimization. Software was developed to stabilize frames, accounting for eye saccades. Use of a biosensor enabled accurate measurement of pulse waveform, increasing signal-to-noise ratio. The optimal light requirements were determined such that adequate exposure of the retina is reproducible yet still