significantly differed at all time points analyzed but became more apparent with advancing post-menstrual age (PMA). At 36-38 weeks PMA, mean score for treatment-requiring disease was 5.2 compared to 1.2 in untreated eyes ($P < 0.01$). 47 eyes received laser (n = 39) or anti-VEGF therapy (n = 8). The mean severity score 2 weeks pre-treatment (4.2) and post-treatment (4.0) significantly differed from treatment time (7.4, $P < 0.0001$ for each).

Discussion: The ROP severity score correlates with clinical progression and response to treatment. The score was an independent predictor of progression to treatment-requiring disease. The score at time of treatment was an independent predictor of disease recurrence.

Conclusions: Automated computer-based image analysis may be considered as a means to monitor disease progression and treatment response in infants undergoing screening for ROP.

023 Treating central-peripheral rivalry (CPR)-type diplopia. Jonathan M. Holmes, Sarah R. Hatt, David A. Leske, Raymond Iezzi

Introduction: Epiretinal membranes (ERM), and other maculopathies associated with abnormalities of the photoreceptor mosaic, may cause central-peripheral rivalry (CPR)-type diplopia (aka dragged-fovea diplopia, binocular retinal diplopia). CPR-type diplopia is notoriously difficult to treat. We evaluated the success of various treatments.

Methods: Fifty patients (44 with ERM) undergoing treatment for CPR-type diplopia (101 treatment episodes) were included. We only included patients with 'sometimes' or worse diplopia for distance or reading, using the Diplopia Questionnaire. We evaluated: prism, Bangerter filter/tape, iseikonic treatment, and ERM peeling. We defined success as improvement in diplopia to 'never' or 'rarely' for distance and reading, at a 6-month follow-up examination. Failure was assigned if diplopia was 'sometimes' or more at follow-up or if in-office treatment failed (persistent diplopia or not tolerated). Each treatment episode was assigned an outcome (not all patients tried every treatment) and success rates calculated with 95% confidence intervals (CIs).

Results: Success was achieved in 4/7 (57%; 95% CI, 18%-90%) using Fresnel prism and 4/28 (14%; 4%-33%) using Bangerter/tape. 8/18 (44%; 22%-69%) had successful resolution of diplopia following ERM peeling (with or without prism). There was one success with iseikonic treatment (1/23; 5%, 0%-22%) but none using loose or ground prism (0/25; 0%, 0%-14%).

Discussion: Fresnel prism treatment was somewhat more successful than expected (presumably by blur) and Bangerter/tape treatment less successful. Unexpectedly, ERM peeling improved CPR-type diplopia in many patients.

Conclusions: CPR-type diplopia may be amenable to treatment by ERM peel, Fresnel prism, or blur and each should be considered for such patients.

024 Machine learning for prediction of pediatric ophthalmology examination lengths and scheduling optimization. Michelle R. Hribar, Wei-Chun Lin, Isaac H. Goldstein, Michael F. Chiang

Introduction: Pediatric ophthalmologists are under pressure to see more patients in less time. This study investigates a machine learning model for predicting exam length in pediatric ophthalmology, based on existing electronic health record (EHR) data.

Methods: Data from 3049 office visits (2015-2018) from five pediatric ophthalmologists were used in a random forest machine learning classification model with 12 features (including prior average exam time, ICD-10 diagnosis code, age, dilation of eyes, patient's language, clinic volume, hour of the office visit). The exam time was predicted to be: short (shortest 20% of exam lengths), medium (middle 60%), or long (longest 20%). Ophthalmologists predicted exam lengths before scheduling each patient based on clinical and social factors. Accuracy was determined by comparing predictions to the actual exam lengths.

Results: The classification model had 65% accuracy for predicting exam length (short vs medium vs long) while the providers' accuracy was 41%. In the machine learning model, the top five predictors of exam length based on mean decrease accuracy (MDA) were prior average exam length, dilation, ICD-10 code, ophthalmologist, and patient age.

Discussion: This study demonstrates that existing EHR data may be used in machine learning algorithms to predict patient exam lengths. We have previously shown using computer-based simulations that scheduling patients according to their exam lengths (shortest exams first) reduced patient wait times. Taken together, this has potential to improve clinical efficiency for pediatric ophthalmologists.

Conclusions: Machine learning methods can predict patient exam lengths with comparable or better accuracy than physicians.

025 Diagnosis of congenital special forms of strabismus based on high-throughput sequencing and high-resolution MRI. Yonghong Jiao, Hongyan Jia, Yi Liang, Yulan Liang, Qinglin Chang, Hui Wang

Introduction: Congenital special forms of strabismus (CSS) are a group of clinically and genetically heterogeneous diseases, which are considered to be neuropathic or myopathic. We aim to establish an effective diagnosis workflow for CSS by utilizing and combining exonic sequencing and MRI.

Methods: 61 families with CSS were enrolled in the study. 22 were familial and 39 were sporadic. All patients underwent comprehensive ophthalmic examinations and MRI. 115 candidate genes have been captured and sequenced, which may be associated with congenital cranial dysinnervation disorder (CCDDs), congenital ptosis, ophthalmoplegia, congenital myopathy and congenital muscular dystrophies (CMD). After excluding mutations in the 115 candidate genes in 22 probands, we conducted whole-exome sequencing (WES).

Results: MRI examinations of 61 patients showed marked hypoplasia cranial nerve and/or extraocular muscles. 9 mutations in 5 genes (*KIF21A*, 45.9%; *TUBB3*, 13.2%; *POMGNT1*, 1.6%; *RYR1*, 1.6%; *CHN1*, 1.6%) from 39 patients (63.9%) were identified. Out of 39 patients, 27 were diagnosed with congenital fibrosis of extraocular muscles (CFEOM), 2 patients were diagnosed with muscle-eye-brain disease (MEB), 2 patients diagnosed with familial Duane syndrome and 1 patient diagnosed with CMD. 4 patients with potentially pathogenic variants were identified with WES.

Discussion: Since CSS usually have overlapping clinical features, accurate diagnosis of CSS-related diseases is challenging. Combining MRI with exonic sequencing, the diagnosis rate could increase effectively.

Conclusions: We established a high sensitivity and specificity diagnosis workflow for CSS, based on MRI and targeted exonic sequencing, which could be a rapid, cost-efficient diagnostic option for clinicians to utilize.

026 What causes slow binocular reading in amblyopic children? Krista R. Kelly, Reed M. Jost, Bryan De La Cruz, Jeffrey S. Hunter, Lori Dao, Cynthia L. Beauchamp, Joel N. Leffler, Becky Luu, Eileen E. Birch