Optimizing treat and extend regimens using artifical intelligence based on OCT imaging in the FLUID study

Abstract Number: 5190

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DisclosureBlock: Jennifer Joan Arnold, None; Hrvoje Bogunović, None; Robyn H. Guymer, None; Sebastian M. Waldstein, None; Caroline Markey, Novartis Code C (Consultant), Amir Sadeghipour, None; Bianca S Gerendas, None; Ursula Schmidt-Erfurth, None;

Purpose
Treat and extend (T&E) is a popular treatment regimen in anti-vascular endothelial growth factor (VEGF) therapy in neovascular age-related macular degeneration (nAMD) management. Optimizing treatment protocols is paramount to achieving best outcomes worldwide. The FLUID study, which assessed 24 month efficacy of two different treatment T&E protocols using ranibizumab, one tolerant and the other intolerant of sub-retinal fluid (SRF), offers a unique data set to apply validated and accurate articifial intelligence (AI) methodologies to assess the role of SRF.
Methods
Subjects with treatment-naive nAMD undergoing treatment with intravitreal ranibizumab 0.5mg over 24 months using two different T&E protocols were evaluated via standardized assessment of best corrected visual acuity (BCVA) and spectral-domain optical coherence tomography (SD-OCT) imaging. Validated and accurate methods were used to segment neurosensory layers and automatically detect and quantify intraretinal IRF) and subretinal (SRF) fluid on SD-OCT.
Results
279 subjects completed the FLUID study, showing non-inferiority for tolerating SRF when using a T&E protocol for the primary endpoint measure of mean change in BCVA over 24 months. AI-based analyses were able to precisely discriminate and quantify IRF and SRF in a fully automated manner at baseline and at each visit during follow-up in both arms of the study. The model accurately monitored the therapeutic response regarding the resolution of fluid in different retinal locations over time. IRF volumes (nl) resolved most rapidly, while SRF (which triggered retreatment in the SRF intolerant arm only) responded at a slower resolution rate. The predictive value of determining qualitative and quantitative fluid biomarkers for long term outcomes using AI is to be further analysed.
Conclusions
Fully automated evaluation of neovascular activity by AI-based image analyses provides a reliable tool for determining therapeutic efficacy. Understanding the impact of retinal fluid by quantity and location will greatly help to fomulate optimal treatment protocols for the delivery of anti-VEGF for nAMD world wide
Layman Abstract (optional):
Image analysis using Artifical intelligence can reliabily assess disease activity and therefore could help to optimize treatment regimens in the management of wet age-related macular degeneration