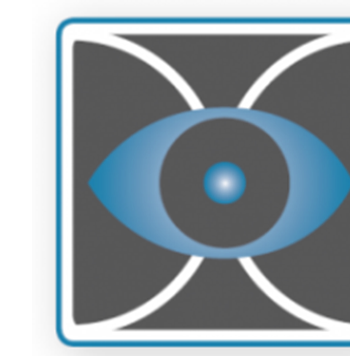


# Data driven discovery of anti-VEGF treatment response groups based on fully automatic vitreomacular interface segmentation



**OPTIMA**  
Ophthalmic Image Analysis



Vienna Reading Center



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## Purpose

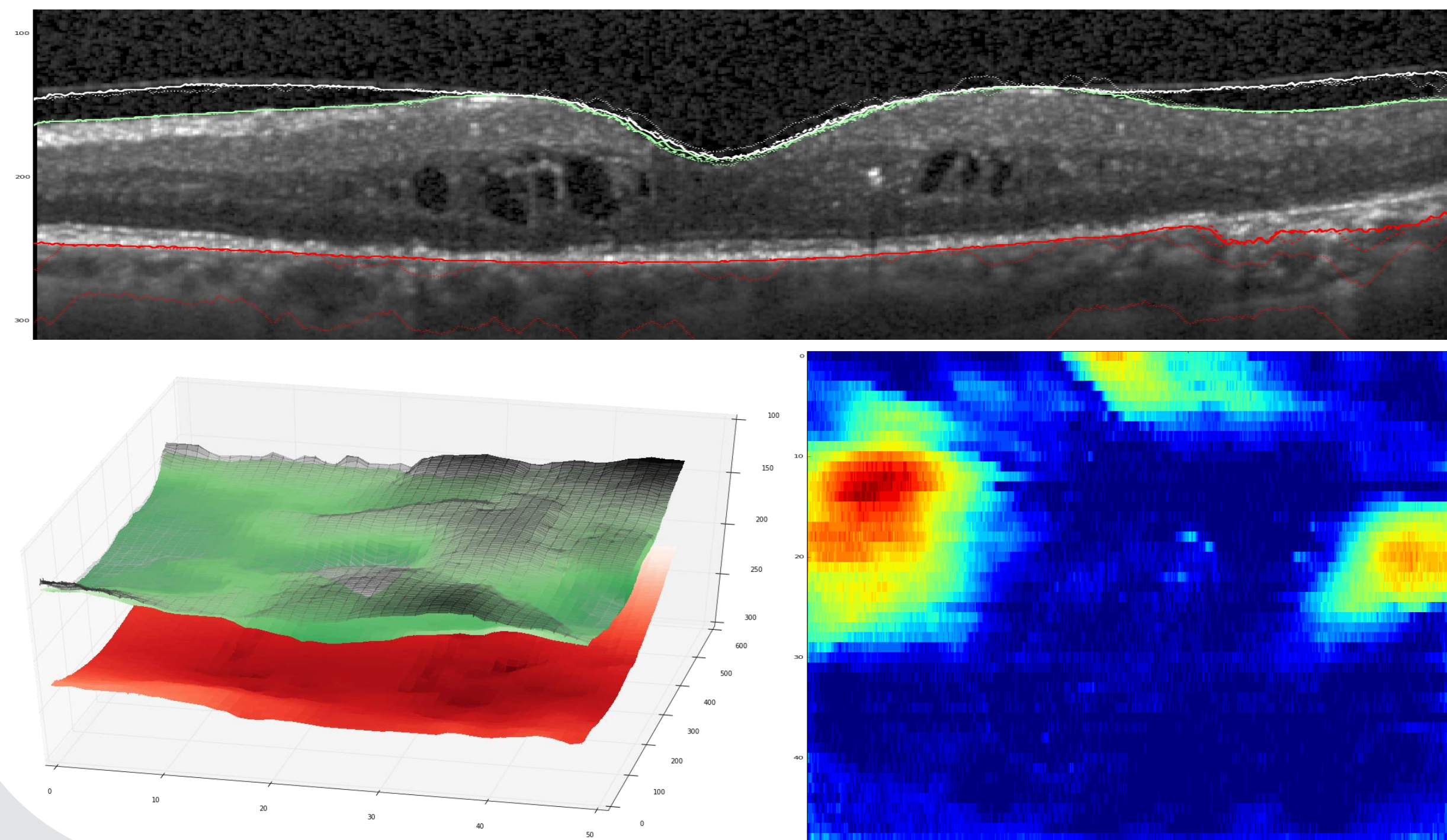
To study the effect of vitreomacular adhesion (VMA) on functional response to anti-vascular endothelial growth factor (VEGF) therapy using fully automated image processing of optical coherence tomography (OCT) data in large scale clinical trials populations.

## Data

Baseline SD-OCT scans (Heidelberg Spectralis, 6x6mm, 49 B-scans) of **238 / 187 patients** included in prospective trials evaluating anti-VEGF therapy for macular edema secondary to branch / central retinal vein occlusion (BRVO / CRVO) were collected.

The progression of best-corrected visual acuity (BCVA) scores were analyzed for each patient up to **month 6** (BRVO) and **month 12** (CRVO).

Fig. 1: **top**: example B-scan  
**bottom left**: automatic segmentation of posterior vitreous boundary (VIT, white), inner limiting membrane (ILM, green) and retinal pigment epithelium (RPE, red)  
**bottom right**: ILM-VIT distance map



## Methods

Each baseline OCT scan was processed using a **fully automated 3D segmentation** algorithm yielding an inner limiting membrane (ILM) and posterior vitreous boundary (VIT) surface (see Fig. 1). The two surfaces were used to generate **distance maps** which were grouped into

## Results

**CRVO**

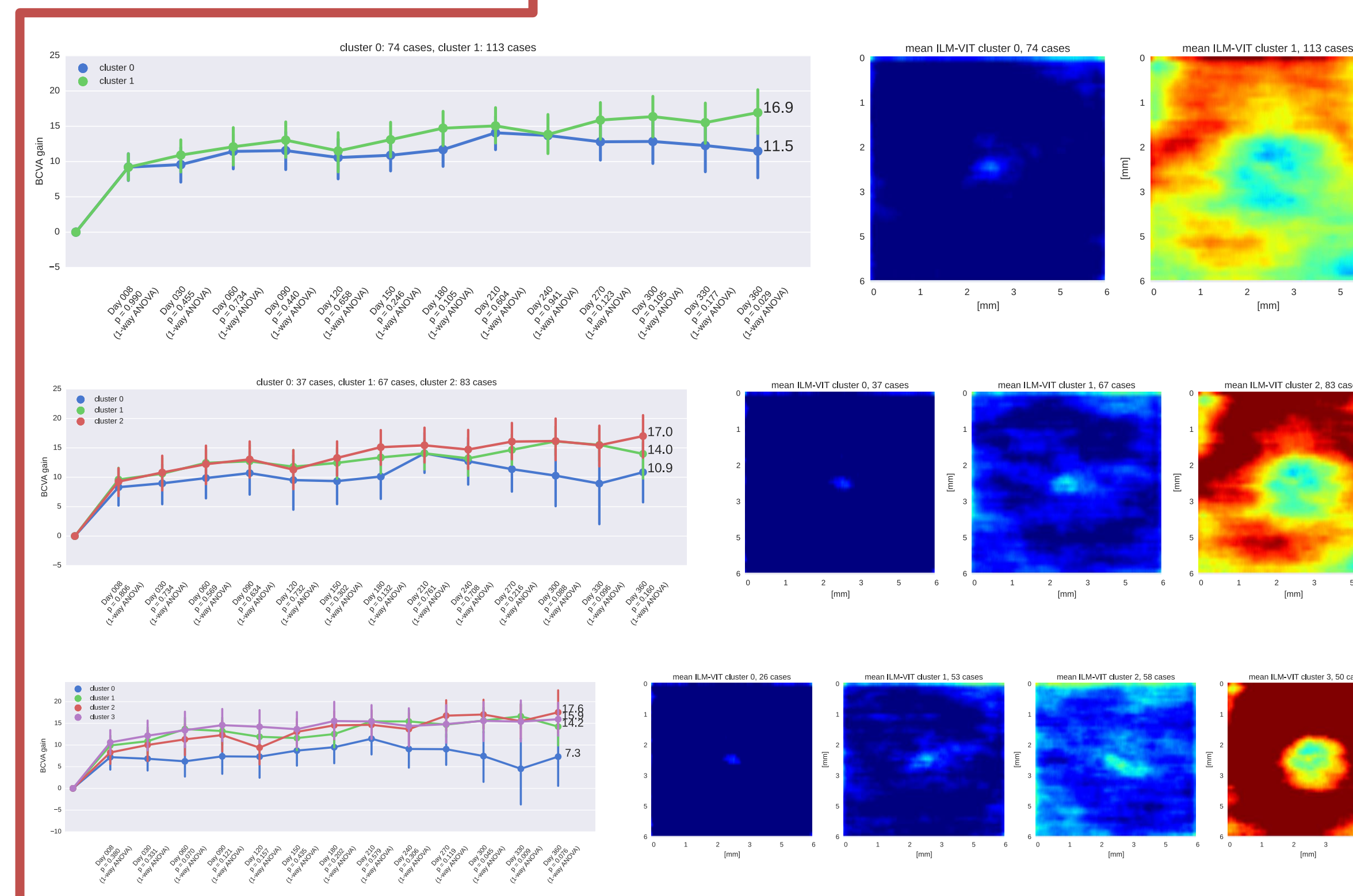
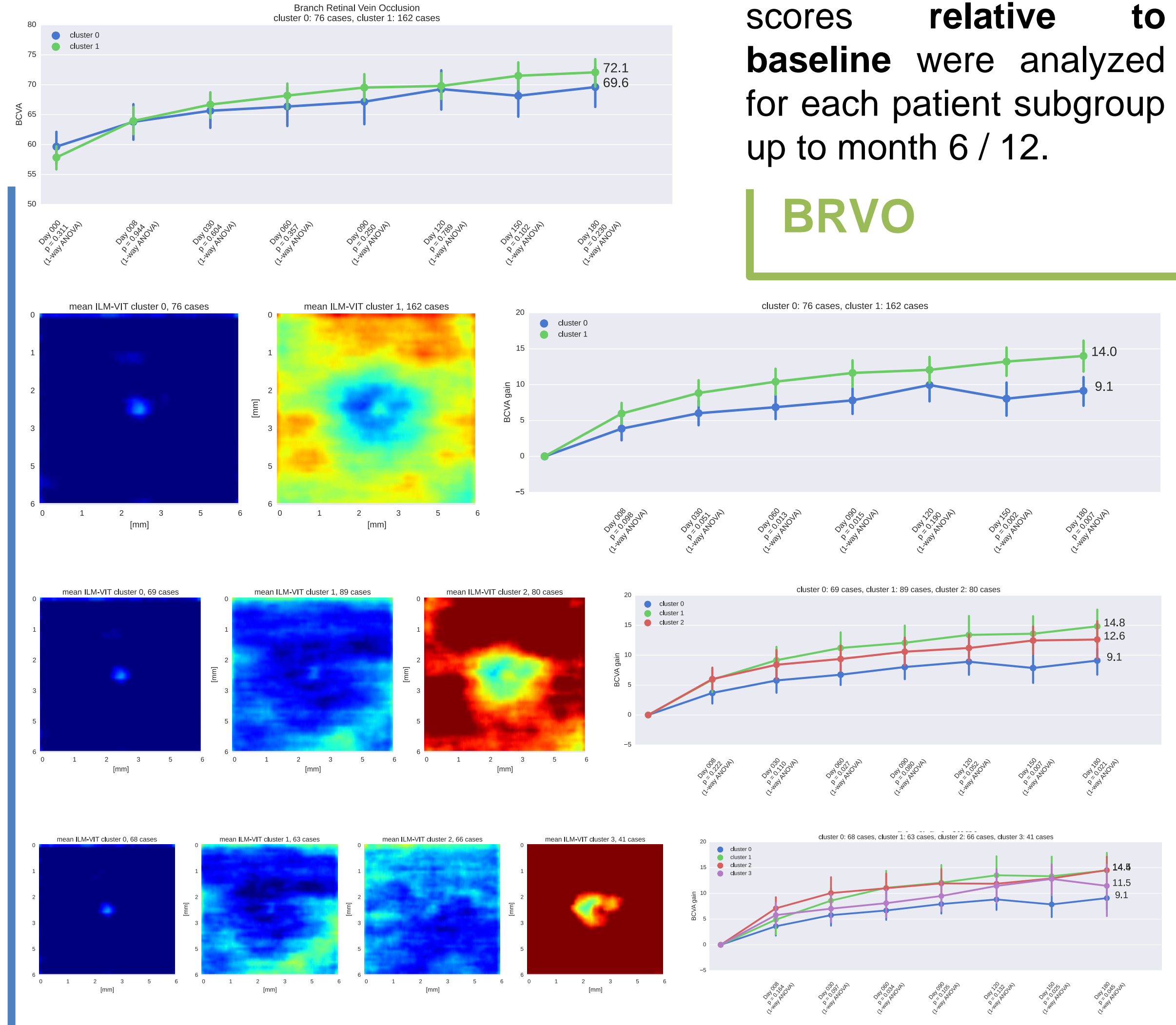


Fig. 2:  
**top**: progression of BCVA scores  
**left/right**: progression of BCVA relative to baseline in CRVO/BRVO  
**center**: ILM-VIT distance maps of detected cluster centers

**multiple clusters** using **unsupervised machine learning** algorithms (see Fig. 2). Each patient was assigned to the closest cluster center and the progression of the **absolute** best-corrected

visual acuity scores and scores **relative to baseline** were analyzed for each patient subgroup up to month 6 / 12.

**BRVO**



**Conclusion** The configuration of the vitreomacular interface can be efficiently analyzed in detail using **ILM-VIT distance maps** obtained by our fully automated segmentation method.

**Unsupervised machine-learning** based clustering of the vitreous configuration maps revealed robust morphologic subgroups of patients with clinically distinct functional response patterns to anti-VEGF therapy in branch / central vein occlusion.

