# Basel Retinal OCT Language Lexicon

**Terms and abbreviations used in structural OCT retinal diagnostic**

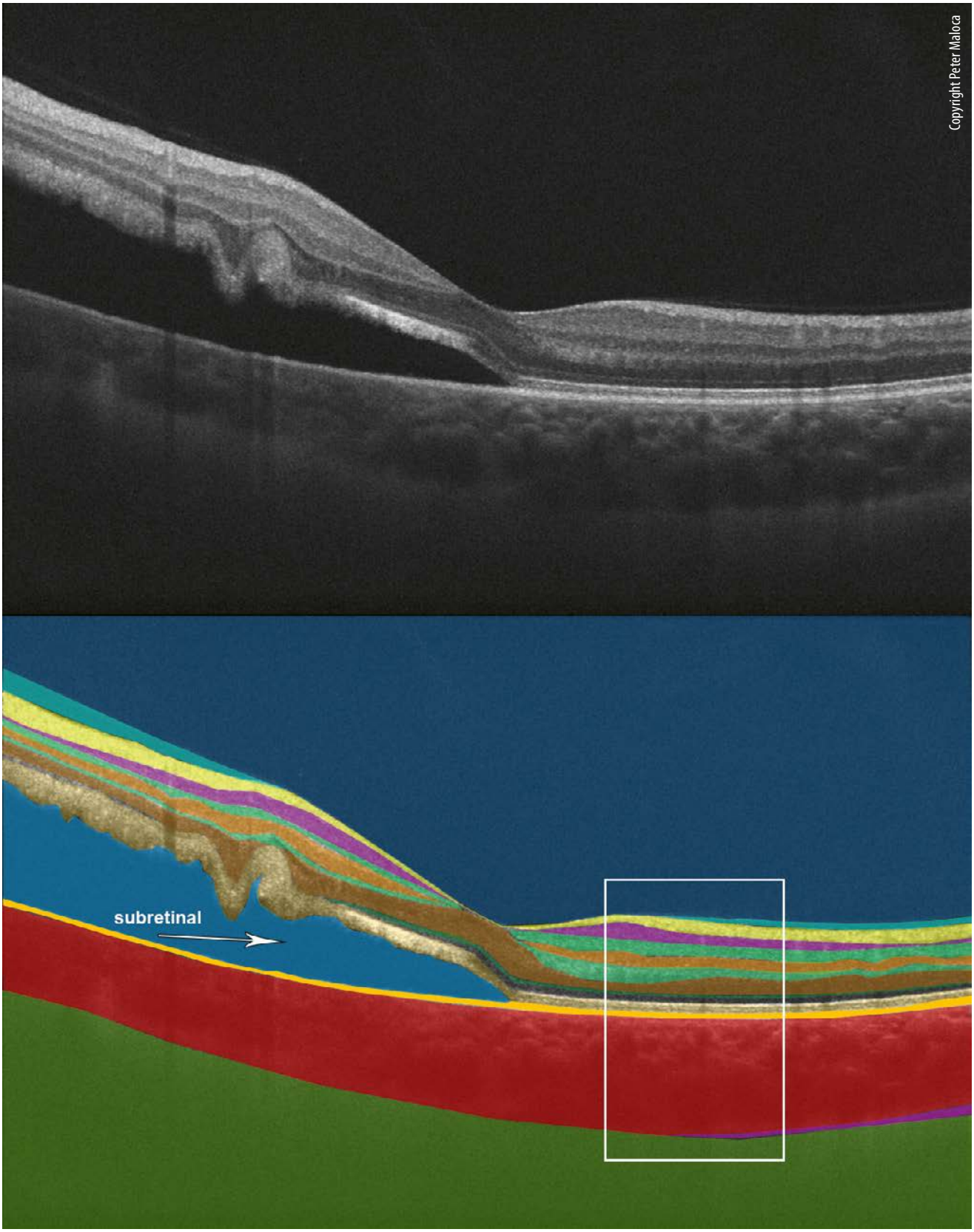
Pascal W. Hasler, Eye Clinic, University Hospital Basel, Switzerland

Take me out

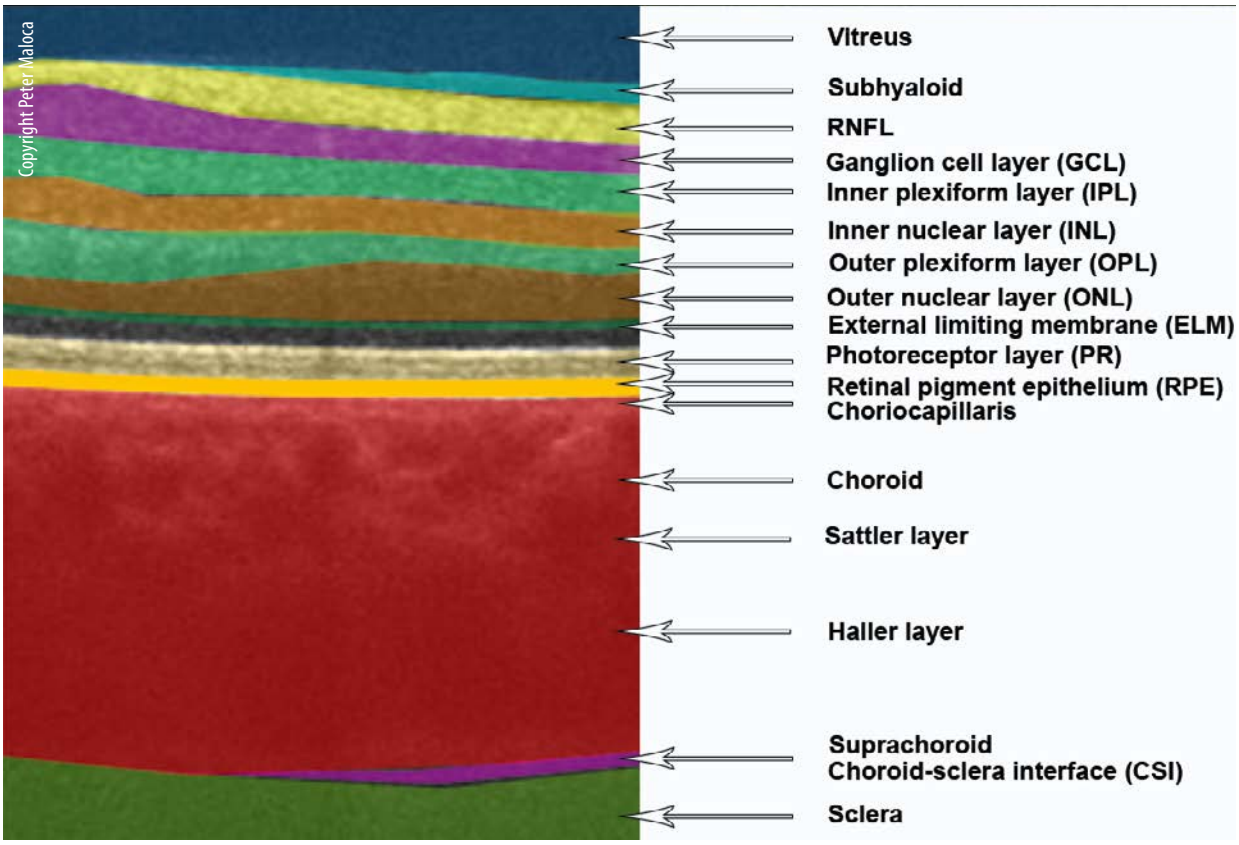
**Eine einheitliche und verständliche Terminologie ist in der Ophthalmologie von entscheidender Bedeutung. Sie dient der effektiven und konsistenten Kommunikation unter uns Ärzten. In den letzten Jahren entstand eine Plethora an OCT-Begriffsabkürzungen, welche teils nur beim OCT auftreten oder direkt von der Histologie übernommen wurden. Letztendlich sind es Ansammlungen von zumeist 3 Buchstaben, welche für die Beschreibung eines OCT-Schnittes gebraucht werden. Nicht jedem Ophthalmologen sind diese Buchstabengruppen geläufig; sie müssen somit erlernt werden. Das OCTlab Basel möchte den Lesern mit dieser OCT-Terminologie-Liste, welche sicherlich nicht komplett ist, helfen, die OCT-Sprache zu erlernen und sie so auf Ihrem Weg zu einem besseren Verständnis von OCT-Bildern begleiten. In den kommenden ophta-Ausgaben werden wir anhand von Beispielen versuchen, Ihnen diese Terminologie vertrauter zu machen.**

***Une terminologie uniforme et compréhensible est essentielle en ophtalmologie. Elle permet une communication efficace et cohérente entre nous, médecins, ainsi qu'à l'égard des patients lorsque nous leur expliquons leurs résultats. Vu la pléthore de termes liés à la TCO apparue ces dernières années, il est temps de réaliser une compilation organisée répertoriant la terminologie relative à la TCO. Dans un voyage visuel ne suivant pas un ordre précis, je montre aux lecteurs d'ophta le vocabulaire relatif à la TCO le plus important et vous aide peu à peu à mieux comprendre les images de TCO. Ensemble, nous améliorons les compétences pour relever les défis.***

| Term / Akronym | Explanation |
|---|---|
| **Artifact** | Misleading or confusing error in perception and representation as a result of software errors (e. g. misidentification of retinal layers), operator related errors (e. g., off center artifact) or patient-related factors (e. g. blinking). |
| **AVL** | *Acquired vitelliform lesion.* Descriptive term for hyperreflective material between RPE and retina. Also called vitelliform lesion and is part of the SHRM spectrum. Not pathognomonic since seen in AMD and other diseases. See also SHRM. |
| **Band** | Descriptive term – not part of OCT consensus classification like the term «line». Used sometimes as a synonym for «layers», e. g., inner plexiform layer. |
| **Blockage** | *Shadowing.* Occurs when the OCT beam is partially or completely blocked and cannot reach or penetrate deeper structures. Areas below blocking features (e. g. hemorrhage, drusen, vitreous floaters, swollen inner retina, etc.) appear more or completely hyporeflective compared to normal OCT reflectivity. |
| **CFT** | *Central foveal thickness.* The thickness of the foveal center, normally about 170 microns, whereas «foveal thickness» is measured as a mean of the central 1000 microns (1 mm) diameter area and represents the central circle area of the ETDRS map (about 200 microns thick). |
| **CME** | *Cystoid macular edema.* See edema and cystoid. |
| **Cystoid** | To describe pocket-like fluid accumulation in the retina, but since there is no membranous tissue around the fluid building a shell, it cannot be characterized as a cyst, but still looks like a cyst – therefore labeled cyst-*oid*. ➜ |


Copyright Peter Maloca
subretinal

| Term / Akronym | Explanation |
|---|---|
| **Dipping** | *Sagging* or dipping of an elevated posterior layer of the retina which seems to arise from agglutination to the RPE by presumably fibrinous exudates. Seen e.g. in central serous chorioretinopathy (CSC). |
| **Disruption** | Harmed layer/membrane/zone seen in OCT as discontinuity/interruption/disappearing. Used e.g. as EZ disruption. |
| **Double layer sign** | Describes shallow irregular elevation of the RPE from the underlying Bruch's membrane dividing the RPE/Bruch's complex in two layers. Seen e.g. in type 1 MNV. |
| **DRIL** | *Disorganization of retinal inner layers* where boundaries between ganglion cell layer, inner plexiform layer, inner nuclear layer and outer plexiform layer (see left page and below) cannot be identified. Seems to be a robustly associated biomarker with poorer baseline BCVA and visual prognosis in diabetic macular edema, occurs also in other retinal diseases, where the correlation with visual acuity prognosis is less clear. ➜ |




## From the OCT Visual Priming Study

Roughly 90 Swiss Ophthalmologists participate in the OCT Visual Priming Study of PD Dr. Peter Maloca (OCTlab, University of Basel, and IOB Basel). «Visual Priming» seeks to enhance recognition of relevant findings – for example, OCT findings – by repeated object presentation. Recognition is supported by highlighting distinct areas as shown in this image sequence.
The OCT image to the left shows retinal detachment. The layers become clearly visible as soon as they are segmented and highlighted in colour. Visual Priming – training – will allow to identify the layers «at first sight», without the help of outlining the segmentation in bright colours.

| Term / Akronym | Explanation |
|---|---|
| **Edema** | Thickening of tissue due to increased fluid accumulation. Since the macula and especially the fovea have particular anatomy with long photoreceptor axons (Henle fiber) and long Müller cells, extracellular fluid can accumulate, building cystoid spaces within the retina (CME), especially in the Henle fiber layer and in outer plexiform layer and accordingly with edema. The swelling can also be caused by intracellular edema, e. g., in central artery occlusion. |
| **ELM** | *External limiting membrane,* represents not a true membrane, but a region of zonulae adherent between the photoreceptor cells and Muller cells forming a hyperreflective line/membrane in OCT. |
| **ERM** | *Epiretinal membrane.* Preretinal macular fibrosis forming a highly reflective layer adherent and/or separated from the retina. Sometimes even growing on the posterior surface of the posterior hyaloid membrane. |
| **EZ** | *Ellipsoid zone.* Traditionally called inner/outer segment junction of the photoreceptors but seems anatomically to be correlated with the photoreceptor inner segment ellipsoid, which provides a high reflectivity and is densely packed with mitochondria. However, the anatomical correlation remains disputed. See «EZ integrity» and zone. |
| **EZ integrity** | *Ellipsoid zone integrity.* Describes the status of the EZ and seems to be strongly correlated to visual function. Authors sometimes describe interdigitation zone (IZ) together with EZ as EZ/IZ integrity. In case of harmed integrity use «disruption». See also disruption and integrity. |
| **FCE** | *Focal choroidal excavation.* Localized concavity of the choroid without local scleral changes. Two types can be identified, *conforming* (without separation of the photoreceptor outer segments and the RPE) and *non-conforming* (with space between the two). Seen e.g., in pachychoroid spectrum, choroidal inflammation, retinal dystrophies, and malignancies. |
| **Fenestration defect** | Deeper penetration of light due to loss of RPE, which usually blocks partially the visualization of the choroid, e. g., in cRORA (formerly named geographic atrophy). |
| **Fibrosis** | Interpretation of hyper-reflective layer/s not belonging to normal retinal structures. |
| **Focal choroidal excavation** | See FCE |
| **FTMH** | *Full-thickness macular hole.* Anatomic defect in the fovea that features a disruption of all layers of the neurosensory retina. |
| **Haller's layer** | Thick layer of oval-shaped hyperreflective vessel profiles with hyporeflective cores in the outer choroid. Seen as larger oval vascular profiles beneath Sattler's layer. See also Sattler's layer. |
| **Henle fiber** | Composed of the axons of photoreceptors, mostly seen in the fovea since more and longer axons creating a thick area in OCT. Mostly hyporeflective «within» or, more precisely, just above the outer nuclear layer, sometimes visible as slightly hyperreflective in tilted OCT images. |
| **HRF** | *Hyperreflective foci.* Descriptive term for solitary or grouped hyperreflective intraretinal lesions/foci. Histopathological correlates of HRF are not univocal (e.g., migrating retinal pigment epithelium cells, lipid-laden macrophages, microglial cells, and extravasated proteinaceous or lipid material), but HRF are considered as an OCT biomarker for disease progression, treatment response, and prognosis in retinal diseases. The presence of HRF < 30 µm with medium reflectivity (like retinal nerve fiber layer) in the absence of posterior shadowing in diabetic macular edema indicates an inflammatory phenotype with a potential response to steroidal treatment. |
| **Hyperreflective** | See reflectivity. High OCT signal, especially RPE and ILM create the highest reflective signals in normal OCT imaging. |
| **Hyperreflective dots** | Synonym for hyperreflective foci, but also used in the vitreous and choroid, see HRF. |
| **Hyperreflective foci** | See HRF |
| **Hyporeflective** | See reflectivity. Low OCT signal, e.g., vitreous cavity creates the lowest reflective signal in normal OCT imaging. |
| **ILM** | *Internal limiting membrane.* Boundary between retina and vitreous, formed mainly by basement membrane of Müller cells. |

| Term / Akronym | Explanation |
|---|---|
| **Integrity** | Zone/layer/membrane which look normal and not harmed. See EZ integrity. |
| **IZ** | *Interdigitation zone.* Sometimes also abbreviated IDZ (interdigitation zone). Considered to represent the contact cylinders formed by the apices of the RPE cells that encase part of the outer photoreceptor segments. Sometimes difficult to differentiate from RPE. |
| **LMH** | *Lamellar macular hole.* Characterized by a macular hole not affecting the full-thickness of the neurosensory retina concomitant with an irregular foveal contour and with a split mostly between the outer plexiform layer and the outer nuclear layer, subdivided in tractional and degenerative LMH, and often associated with an epiretinal membrane. The term «pseudo hole» should be reserved for biomicroscopic foveal lesion looking like a FTMH, but confirmed by OCT not being full-thickness lesions (e.g., LMH, ERM, and VFT). |
| **ME** | *Macular edema.* See edema. |
| **MH** | *Macular hole,* in order to differentiate between full-thickness and lamellar, use FTMH (full-thickness MH) and LMH (lamellar MH). |
| **Microcystic** | Palisade-like, see MME and palisade |
| **MME** | *Microcystic macular edema.* Microcystic, palisade-like hyporeflective cystoid lesions in the inner nuclear layer, predominantly seen in the nasal macula in optic neuropathies and after peeling operations |
| **MNV** | *Macular neovascularisation*<br>• Type 1: Formerly known as occult or CNV type 1. The neovascular complex develops from the choroid into the sub-RPE space.<br>• Type 2: Formerly known as classic or CNV type 2. The neovascular complex develops from the choroid through Bruch's membrane and RPE, and is located in the subretinal space.<br>• Type 3: Formerly known as retinal angiomatous proliferation or RAP. The neovascular complex develops in the retina, grows downwards and may also penetrate the RPE into the sub-RPE space. |
| **OCTA** | *OCT-angiography.* Imaging of flow by OCT. |
| **Omega Sign** | Term used in 2 OCT features: 1), omega-shaped disorganization of the inner retinal layers bounded posteriorly by the outer plexiform layer as seen in combined hamartoma of the retina and RPE or 2), omega-shaped outer retinal contour in persistent subretinal perfluorocarbon liquid bubble. |
| **Onion Ring Sign** | Layered hyperreflective lines in the sub-RPE space, usually associated with chronic exudation from type 1 MNV, probably representing crystallization of cholesterol forming crystal layers. |
| **ORA** | *Outer retinal atrophy,* describes the loss of the ellipsoid and interdigitation zone with reduction of the outer nuclear layer. Used in the consensus classification system for AMD. |
| **ORT** | *Outer retinal tubulation.* Rearrangement of photoreceptors identifiable in OCT as rounded or ovoid structures with hyper-reflective edges forming tubes in the outer retina/outer nuclear layer. Seen mostly over RPE atrophy in AMD, but also in various chronic degenerative disorders. |
| **Pachychoroid** | *Thickened choroid.* Normal subfoveal choroidal thickness is approximately 300 microns, but there is a large variety, therefore the most salient feature of pachychoroid is the presence of large vessels in the choroid under an area of reduced or absent choriocapillaris, a common characteristic of the pachychoroid spectrum. |
| **Palisade** | Microcystic or also called palisade-like, a descriptive pattern of small columnar hyporeflective spaces in the inner nuclear layer. See MME |
| **PED** | *Pigment epithelium detachment.* Detachment/separation between the RPE and Bruch's membrane seen as double layer sign in OCT. PED can be classified as:<br>• Serous (hyporeflective filling)<br>• Fibrovascular (hyperreflective filling)<br>• Drusenoid |
| **Prechoroidal cleft** | Hyporeflective space under hyperreflective material in PED between and Bruch's membrane and RPE, associated with high incidence of RPE tears and poor visual prognosis, mostly seen in type 3 MNV. ➜ |

| Term / Akronym | Explanation |
|---|---|
| **Pseudohole** | Term should be reserved for biomicroscopic foveal lesion looking like a FTMH, but confirmed by OCT not being full-thickness lesions (e. g. LMH, ERM and VFT). |
| **RAP** | *Retinal angiomatous proliferation.* A neovascular complex developing in the retina, growing downwards and sometimes even penetrating the retinal pigment epithelium. Now classified as MNV type 3. |
| **Reflectivity** | Ratio of light reflected by tissue/surface compared to the incident light. In OCT, normal retina tissue has different reflectivity pattern, f. e. nerve fibers and RPE display high reflectivity, nuclear layer medium to low reflectivity and photoreceptors low reflectivity. |
| **RORA** | *RPE and outer retinal atrophy:* term used in a consensus classification system for AMD representing a region of signal hypertransmission into the choroid of at least 250µm, a corresponding zone of attenuation or disruption of the RPE of at least 250µm, evidence of overlying photoreceptor degeneration and absence of RPE tear. Classified in iRORA (incomplete RORA) and cRORA (complete RORA), the latter previously being named «geographic atrophy». |
| **RPE** | *Retinal pigment epithelium.* In OCT seen as a highly hyperreflective line together with Bruch's membrane (RPE-Bruch's membrane complex). |
| **Sattler's layer** | Thick layer of round or oval-shaped hyperreflective profiles with hyporeflective cores in mid-choroid. Seen as small oval vascular profiles above Haller's layer. See Haller's layer. |
| **Shadowing** | See blockage |
| **SHRM** | *Subretinal hyperreflective material.* Descriptive term for hyperreflective material (e. g. type 2 MNV, fibrosis, exudation, vitelliform material, scar tissue, hemorrhage) between the retinal pigment epithelium and neurosensory retina. |
| **SRF** | *Subretinal fluid.* Hyporeflective fluid accumulation between the RPE and neurosensory retina. |
| **Subretinal fluid** | See SRF |
| **VFT** | *Vitreo-foveal traction.* Foveal adhesion of the posterior hyaloid is the source of visible morphological changes in the retina. |
| **Vitelliform lesion** | See AVL |
| **VMA** | *Vitreo-macular adhesion.* Macular adhesion of the posterior hyaloid without representing the source of visible morphological changes of the retina. |
| **VMT** | *Vitreo-macular traction.* Macular adhesion of the posterior hyaloid is the source of visible morphological changes of the retina. |
| **Window defect** | Used as a synonym for «fenestration defect» |
| **Zone** | Area which cannot be clearly delineated with presently available technology. Occurs when an OCT feature is seen to be localized to a particular anatomic region, but the specific reflective structure has not been definitively proven. Or the anatomic layers are inseparable owing to the interdigitation of cellular structures and tissues. Used for myoid zone, EZ, and IZ. |

**Author**
PD Dr. Pascal W. Hasler
Director OCT Research Laboratory (OCTlab)
Department of Ophthalmology
University Hospital Basel
Mittlere Strasse 91
CH-4056 Basel

Phone +41 61 265 87 87
www.octlab.ch / pascal.hasler@usb.ch

**Terms highlighted in blue refer to the images on pages 30/31**