# FAF in early AMD

Early AMD is characterised by the appearance of localized RPE hypo or hyper pigmentation and drusen.

Drusen are formed by the accumulation of extracellular deposits in the inner aspects of Bruch's membrane(3).

Depending on their size and morphology, they can be classified as hard or soft drusen.

The molecular composition of drusen is quite complex and has not been completely elucidated (Fig. 5).

FAF changes in early AMD have already been reported by several authors (9,21,25,27,33-36,41); all of them concluding that the changes in ophthalmoscopy and fluorescein angiography are not necessarily related with FAF, suggesting that FAF may provide new information regarding the stages and activity of the disease.

Differentiation between RPE LF and sub-RPE deposits with FAF images in vivo can be a hard work.

An analysis of the variability of FAF in patients with early AMD was recently reported by an international workshop on FAF phenotype in early AMD.

Among their conclusions, a new classification system with eight different FAF patterns was given(39).

Normal pattern characterized by a homogeneous background autofluorescence with a gradual fluorescence decrease in the inner macula towards the foveola (blocked fluorescence caused by yellow macular pigments).

FAF may be normal even in the presence of soft or hard drusen. Minimal change pattern characterized by a limited and irregular decrease or increase of background AF, not associated to any obvious or important topographic pattern.

85 Fundus autofluorescence in age-related macular degeneration Focal increased pattern is defined by the presence of at least one well defined spot (<200 micron diameter) of markedly increased FAF much brighter than the surrounding background fluorescence.

These areas may or may not correspond to large, soft drusen and to areas of hyperpigmentation.

Patchy pattern characterized by the presence of at least one large area with well defined borders (>200 micron diameter) of markedly increased FAF.

Again, these areas may or may not correspond to large, soft drusen and areas of hyperpigmentation.

Linear pattern defined by the presence of at least one linear area of markedly increased FAF with well defined borders.

Linear structures of increased FAF usually correspond to hyperpigmented lines.

Lacelike pattern This pattern shows multiple branching lines of increased FAF forming a lacelike pattern.

The borders may be hard to define, and FAF may gradually decrease from the centre of the linear area towards the surrounding background.

This pattern may correspond to hyperpigmentation or to non visible abnormalities.

Reticular pattern is defined by the presence of multiple small, ill defined areas (<200 micron diameter) of decreased FAF.

This pattern has been found to occur not only in the macular area, and may be associated with multiple small soft drusen, hard drusen or areas with pigment changes or non visible abnormalities.

Speckled pattern is characterized by the simultaneous presence of different types of abnormalities in a large area.

The changes reach beyond the macular area and may cover the entire posterior fundus.

These abnormalities include multiple small areas of irregular increased or decreased FAF corresponding to hyper and hypopigmented areas and multiple subconfluent and confluent drusen.

The speckled pattern has been reported to be the most frequent (26%) followed by the patchy pattern (23%).

The most infrequent patterns are the normal pattern (2%) and the lacelike pattern (2%).

The study confirmed that visible drusen on fundus photography are not always correlated with noticeable FAF changes and that areas of increased FAF may or may not correspond to areas of hyperpigmentation or soft or hard drusen.

Several authors have also mentioned the different FAF patterns in eyes with drusen.

Delori et al. described a pattern consisting of decreased FAF in the centre of the drusen surrounded in most of the cases by a ring of increased FAF[(27)].

They also observed that the decreased drusen signal was not as intense as in the areas with RPE atrophy.

The authors hypothesized that it might be caused by a displacement of the cytoplasm and LF granules in RPE cells instead of an actual RPE atrophy[(35)].

Von Rückmann et al. further reported that crystalline drusen are characterised by a decrease in FAF signal, signalling the onset of atrophy.

Lois et al. confirmed that areas of confluent drusen are usually associated with focal, mildly increased FAF and that only large subfoveal soft drusen (drusenoid RPE detachments) topographically correspond with focal changes of FAF[(33)] (Fig. 6).

Smith et al. recently reported their results after using image analysis software to study drusen and pigmented areas on fundus photographs from AMD patients[(41)].

The authors initially used image analysis algorithms, including automated background levelling and thresholding.

Areas of focally increased FAF intensities were compared to the normal background signal.

By overlapping fundus photographs and FAF, the topographic correlation of drusen and pigmented areas with focally increased FAF signals was established.

Smith and co-workers reported that eyes with isolated drusen or pigment abnormalities were better correlated with FAF abnormalities than eyes with geographic atrophy[(41)].

Regarding areas with changes in RPE, hypopigmented areas are usually associated with a corresponding decreased FAF signal, suggesting an absence or degeneration of RPE cells, with reduced content of LF granules. (Fig. 7 and 8).

However, hyperpigmented areas frequently show a higher FAF signal, which may be caused by a higher concentration of autofluorescent melanolipofuscin[(35)] (Fig. 9).

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