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VISION ACADEMY VIEWPOINT

The Vision Academy is a partnership between Bayer and ophthalmic specialists, established with the aim of addressing key clinical challenges in the field of retinal diseases: www.visionacademy.org.

The Role of OCT-A in Retinal Disease Management

Background

In recent years there has been rapid development in both the technology and number of imaging modalities utilized in the field of ophthalmology; in particular, optical coherence tomography (OCT) has become a widely used imaging tool. Optical coherence tomography angiography (OCT-A) is a non-invasive, non-dye-based imaging technique that can rapidly produce high-resolution, cross-sectional scans of vascular flow in seconds.[1-4]

As such, there is growing interest in the use of this technique in the retinal disease community. However, to date, no clinical trials have included OCT-A-based endpoints. There is therefore little consensus on the role of OCT-A in the diagnosis or monitoring of retinal disease and current recommendations state that the use of OCT-A is not essential for good patient management.[5]

This Viewpoint examines the role of OCT-A in the management of neovascular age-related macular degeneration (nAMD), with a focus on its current utility, limitations, and potential for future applications, both clinically and from a research perspective.[5]

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Date of review: May 2021

Full consensus Variations in opinion

Viewpoint

1. **At this time, OCT-A should be considered a complementary diagnostic tool in the portfolio of imaging modalities with fluorescein angiography, indocyanine green angiography, and structural OCT**

The effectiveness of OCT-A has been demonstrated in principle for the diagnosis of choroidal neovascularization in patients with nAMD, and the technique has the potential to improve the accuracy of diagnosis in clinical practice.[6] OCT-A in combination with structural OCT has been shown to be more effective than either fluorescein angiography or OCT-A alone for the evaluation of macular complications associated with retinal disease.[7] OCT-A may also be useful in cases where patients are unsuitable for dye-based techniques (e.g. allergy or pregnancy) or where accurate assessment may be difficult.[2] However, there are several challenges with the technique that should be considered:

- OCT-A has a limited ability to detect slowly flowing structures[2] and is also limited in its ability to detect the extent of vascular leakage
- Physician experience with OCT-A image interpretation is currently limited and there remains a lack of understanding of what constitutes normal and disease morphology, particularly for structures such as choriocapillaris

2. **Physicians should be aware of the multiple imaging artifacts that are possible with OCT-A**

OCT-A image artifacts can be caused by distortions resulting from errors in image processing and display or ocular motion.[8] Eye characteristics such as high myopia can also cause image artifacts.[8] Furthermore, shadow artifacts can be caused by prominent media and vitreous opacities (“floaters”) and superficial retinal vessels.[8,9] Interference from superficial vessels can also cause projection artifacts, even when using the latest software that may provide a partial solution to correct such segmentation errors.

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Further considerations

While OCT-A has shown great potential for use in clinical practice as an additional tool for diagnosis, its use as a primary method in diagnosis and disease monitoring is yet to be understood. There is currently no consensus on whether OCT-A would be useful in all cases or in specific patient subgroups.

The use of OCT-A is growing faster than the community's understanding of and experience with the technique, and there are a number of knowledge gaps the Vision Academy believes need to be addressed:

- Several methods of OCT-A image acquisition have been developed, using a variety of technical protocols that have not yet been sufficiently validated[4,10-14]
- OCT-A may potentially identify new biomarkers for different retinal diseases, which may provide a valuable tool for detecting the early stages and progression of ocular diseases[15]; these could be used to monitor specific pathologies (e.g. subretinal hyperreflective material lesions) that may be helpful in monitoring disease activity and response to treatment.[16] This, however, remains to be demonstrated
- The need for standard protocols for image acquisition and interpretation should be a primary focus. As a new technology, further research is needed to define best practice for OCT-A in various retinal diseases

Full consensus Variations in opinion

Vision Academy Viewpoints are intended to raise awareness of a clinical challenge within ophthalmology and provide an expert opinion to engage in further discussion.
They can be downloaded from https://www.visionacademy.org/resource-zone/resources/all
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