OCT Angiography

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- Time-domain
  - Commercially available in the US in 2002
  - Zeiss Time-domain OCT (Carl Zeiss Meditec, Dublin, CA)

- Spectral domain technology in 2006
  - FDA approval in 2006
  - Vastly improved resolution
  - Motion correction technology

- Instruments
  - Optovue Avanti
  - Zeiss CIRRUS
  - Heidelberg Spectralis
  - Topcon 3D – FDA approval July 2007

- Swept source OCT
  - Faster – less motion artifact
  - Invisible light source

- Instruments
  - Topcon DRI OCT Triton
    - FDA approval in January 2018
    - posterior and anterior segment OCT, color, and red free imaging. FA and FAF photography available on the Plus model. OCTA available outside of the US
  - PLEX Elite 9000, Carl Zeiss Meditec, FDA approval for research November 2016

- OCT Angiography
  - Images retinal blood flow

- Technology
  - Zeiss AngioPlex – FDA approval, September 2015
  - Optovue AngioVue – FDA approval February 2016; AngioAnalytics and 3D PAR (projection artifact removal) FDA approval June 2018
  - Heidelberg Spectralis OCTA – FDA approval September 2018
  - Topcon DRI OCT Triton
    - Swept source OCT
    - Angiography option not available in the US

- Traditional imaging modalities for retinal blood flow

- Fluorescein angiography (FA)
  - Introduced in 1961
  - Risks with injection of a dye involve nausea, vomiting, and anaphylactic shock
  - Change in use among retinal specialists in recent years

- Indocyanine green (ICG)
  - Used occasionally
  - Evaluation of the deeper choroidal circulation

- OCTA advantages over traditional imaging modalities
  - Better delineating of the foveal avascular zone (FAZ)
  - Better imaging of capillary dropout

- Disadvantages of OCTA as compared with traditional imaging modalities
  - Poor technique for peripheral imaging
  - Unable to show leakage, pooling, or areas of very slow flow such as aneurysm

- Review the appearance of retinal layers on OCT and the location of vascular zones
  - Superficial capillary plexus or network – lies in the nerve fiber layer or ganglion cell layer
  - Deep capillary plexus – lies in the inner nuclear layer near the outer plexiform layer

- OCTA imaging
  - check for artifact, media opacity, high refractive error, truncation, shadowing, and accurate segmentation
    - Pay attention to foveal avascular zone, vessel density numbers, capillary dropout, and microaneurysms

- Case studies – most commonly used for AMD, diabetic retinopathy, glaucoma, and vascular occlusive disease

- Diabetic retinopathy
  - Capillary dropout
  - Foveal avascular zone
  - Neovascularization

- Macular degeneration
  - Detection of CNVM
  - Caution with segmentation as retinal cytoarchitecture may be disrupted, especially with larger drusen

- Glaucoma
  - Visualize decreased papillary, peripapillary, and macular perfusion in glaucoma eyes compared with normal eyes

- Other conditions
  - Trauma
  - Branch vein occlusion