



Institute of
Medical
Illustrators

Clinical Photography, Art,
Graphics and Video in Healthcare

IMI National Guidelines

Ophthalmic Imaging

The IMI National Guidelines have been prepared as baseline guides on specific aspects of medical illustration activity and provide auditable standards for the future.

The Guidelines can be either implemented in full, or may be amended according to individual requirements.

Copies are available on the IMI website (www.imi.org.uk)

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1. Iris - Pigment Layer Atrophy
3. Cornea - Epithelial Cyst
5. FFA - Branch Retinal Artery Occlusion
7. OCT - Acquired Pit Optic Nerve (APON)

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6. Occulo-Plastic - Anophthalmic Socket
8. ICG - Subretinal Neovascular Membrane

Introduction

These Guidelines provide "Clinical Imaging Standards" and "Recommended Good Practice" for Ophthalmic Imaging. The focus is on a wide spectrum of ophthalmic conditions likely to be encountered by those using the "Guidelines" as a reference for their own practice. It is emphasised that Ophthalmic Imaging is a rapidly changing field and practitioners will need to keep up to date with the changes.

Users of these Guidelines must have a good knowledge of anatomy as related to ophthalmology; the visual appearances of ophthalmic diseases and conditions; be able to recognize structures and pathology within the eye, its layers and supporting structures; the lacrimal apparatus; the orbits; extraocular muscles; eyelids and adnexa. Additionally, users must be able to interpret basic Visual Acuity measurements and relate these to their retinal imaging practice.

It is expected that users will be completely familiar with the operation and functions of the particular ophthalmic equipment used in their practice. For 'Step by Step' technical instructions consult the publications listed under ***Bibliography*** at the end of the Guidelines and the ***User Manuals*** provided by the equipment manufacturers and software suppliers. For newcomers to retinal imaging, or for more experienced personnel wanting to review their techniques and knowledge, references to basic 'On-Line' tutorial material are given in the ***Bibliography***

Standards of Practice

It is essential the users of these Guidelines, who carry out fluorescein angiography and indocyanine green angiography, are fully conversant with the contraindications for these procedures; are able to recognise allergic reactions to fluorescein and indocyanine green; and take the appropriate emergency steps according to local procedures. All patient reactions must be reported and documented in accordance with local protocols.

Users who are permitted under local authority to instil medications to achieve mydriasis must be aware of contraindications to the use of certain mydriatics and be able to warn patients, and/or their guardians and caregivers, of the effects and dangers of dilated pupils after imaging procedures. Similarly, users who instil topical anaesthetics in order to carry out gonioscopy or anterior segment photography must also warn patients of the dangers of having an anaesthetised cornea.

Health and Safety considerations must be observed by users in terms of prevention of cross infection, adequacy of the space in which procedures are carried out and the electrical and mechanical safety of the equipment being used. Any Health and Safety issues involving patients or staff must be promptly reported in accordance with local protocols. See references in the ***Bibliography***.

These “Guidelines” have been arranged in the same manner as the main sub-specialties within ophthalmology.

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SECTION A. OCULO-PLASTIC IMAGING STANDARDS

INTRODUCTION

Reproduction Ratios

Whilst lens focal lengths have been specified, lenses $\pm 10\text{mm}$ of the stated Focal Lengths would conform provided the appropriate “Reproduction Ratios” and “Lens to Subject Distances” are maintained.

Two Reproduction Ratios with corresponding lens focus settings are given for each Guideline; the first is based on the common CCD imaging format of 23.7mm x 15.6mm (Nikon DX format); the second is the 24mm x 36mm format used for 35mm film. The 24mm x 36mm format is available as a digital format; Canon EOS 5D camera (Canon EOS 23.9mm x 35.8mm); Nikon D3 camera (Nikon FX digital format 23.9mm x 36mm).

Lens settings are based on those marked on the Nikon 60mm and 105mm Micro Nikkor lenses. (Other lenses must be calibrated to meet these standards.) As lenses are not marked for the digital ratios it is common practice to achieve standardisation by using the closest lens focus as marked on the lens barrel. These lens focus settings are included in the Guidelines for each of the two camera formats.

Lenses

In general, for the 23.7mm x 15.6mm Digital Imaging Format, the **Facial** and **Orbits views** can be readily handled with a 60mm Focal Length Lens. This provides a suitable working distance with adequate space for lighting and eliminates perspective distortion. The **Single Eye with Adnexa** and **Single Eye views** require the working distance provided by a 105mm Focal Length lens.

For 24mm x 36mm imaging format a 105mm Focal Length lens is used for all views and should adhere to the established “*Westminster*” Reproduction Ratios.

Variable focal length (Zoom) lenses should be avoided unless “Reproduction Ratios” and “Lens focus settings” are comparable to the parameters in these Guidelines.

Reference - Maintaining standard scales of reproduction in patient photography using digital cameras – Stephen Young. *J Audiov Media Med* 2001; 24: 162 – 165. (The standards introduced by this paper have been adopted for other IMI Published Guidelines and form the basis for these Oculo-Plastic Guidelines).

Lighting

Lighting must be simple and reproducible; large, multiple conflicting reflections and shadows must be avoided. Some degree of 'modelling' must be used. The aim is to produce a single, small corneal or conjunctival reflex with minimal reflections from the Cornea, Conjunctiva and Lid margins. However, reflections must not be totally eliminated.

Coaxial illumination is rarely indicated.

When lighting the **Single Eye with Adnexa** and the **Single Eye views** the light reflection is positioned to fall on an unimportant area of the conjunctiva or cornea.

The standardised lighting parameters should be applied equally in the Studio; Clinic Examination room; Ward or Procedure Room.

Positioning the Patient

The Anatomical Planes and Lines of the Head as related to Ophthalmology must be used to define patient position and its relationship to the camera's optical axis using surface anatomical landmarks.

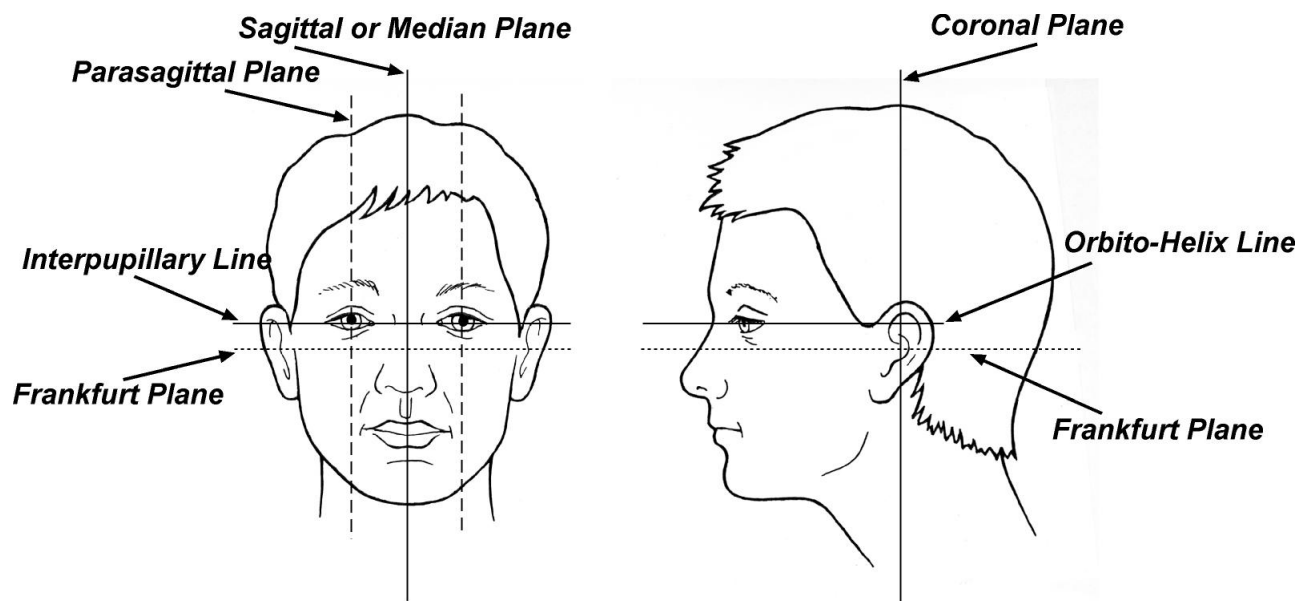


Figure 1 Showing the Sagittal or Median Plane; Coronal Plane; Interpupillary Line; Frankfurt Line or Reid's Base Line; the Orbito-Helix Line; Corneal Parasagittal Planes (The two planes running parallel to the Sagittal Plane through the centre of each Cornea when the patients fixates in the Primary position of Gaze). The Interpupillary Line and the Orbito-Helix Line together form a Transverse plane which is especially useful to the Ophthalmic or Clinical Photographer in positioning the patient's head relative to the camera optical axis.

Lateral and Oblique positions must be achieved by moving the seated patient rather than using axial rotation of the patient's head. The Oblique angle can be standardised by adjusting the camera axis so that the tip of the patient's nose aligns with the profile of the distal cheek. Due to patient variation of the cheek soft tissue profile and nasal architecture this can only be standardised for a particular individual patient.

Positions of Gaze (refer to **SECTION F. NEURO-OPHTHALMOLOGY**)

ORBITS - ORBITAL VIEW (also referred to as "Both Eyes")

Ideally the head should be restrained to prevent compensatory head movement with the Secondary and Tertiary positions.

Primary Position

- The direction of gaze is straight ahead into the camera lens.

Secondary Positions

The patient is directed to look: -

- Straight Up as far as possible
- Straight Down as far as possible
- Straight over to the Right as far as possible, and
- Straight over to the Left as far as possible.

Tertiary Positions

The patient is directed to look: -

- Up and to the Right as far as possible
- Up and to the Left as far as possible
- Down and to the Right as far as possible
- Down to the Left as far as possible.

Upper Eyelids must be retracted for the Secondary and Tertiary Inferior Positions.

Special Note: Conditions such as eyelid lesions may require the higher magnification and controlled illumination provided by an ophthalmic photo-slittlamp in addition to the views described in this section.

APPLICATION STANDARDS

**EXOPHTHALMOS; THYROID EYE DISEASE; PROPTOSIS; PTOSIS;
ORBITAL TUMOURS; ORBITAL FRACTURES;
MARCUS GUNN SYNDROME; TRAUMA; COSMETIC PROCEDURES**

FACIAL VIEWS

- Anterior Full Face
- Right Lateral Face
- Left Lateral Face
- Right and/or Left Oblique Face may be indicated
- Camera Axis is directed to the point where the Median Plane meets the Interpupillary Line at the level of the Orbito-Helix Line.

Reproduction Ratio **1:12 - 1.0metre (60mm focal length lens)** 16mm x 24mm
 1:8 - 1.0metre (105mm focal length lens) 24mm x 36mm

Image Orientation - Vertical

Plane of Focus - Anterior view - the Corneal Reflex.

Lateral and Oblique views the Focus is on the Corneal profile closest to the camera, i.e. Corneal para -sagittal plane.

EXOPHTHALMOS; THYROID EYE DISEASE; PROPTOSIS; PTOSIS; ORBITAL TUMOURS; ORBITAL FRACTURES; BLEPHAROSIS; ECTROPION; TRAUMA; ENTROPION; TRICHIASIS; KERATOCONUS; COSMETIC PROCEDURES; LAGOPHTHALMOS; NINE POSITIONS OF GAZE

ORBITS - ORBITAL (also referred to as "Both Eyes")

- Anterior
- Right Lateral
- Left Lateral
- Right and Left Oblique
- Superior ("Birds Eye View"); or Inferior ("Worms Eye View") may be indicated

For example, the Superior ("Birds Eye View") is useful to record degree of Proptosis and Keratoconus (Munson's Sign)

- Camera Axis is directed to the point where the Median Plane meets the Interpupillary Line at the level of the Orbito-Helix Line.

Unless otherwise indicated the eyes are in the **Primary Position of Gaze**. The eyelids would be in a normal "resting" open position.

In cases of exophthalmos or proptosis where the lids do not close to cover the cornea, lagophthalmos, an additional view with the eyes closed is required.

Reproduction Ratio **1:6 - 0.5metre (60mm focal length lens)** 16mm x 24mm
 1:4 - 0.6metre (105mm focal length lens) 24mm x 36mm

Image Orientation - Horizontal

Plane of Focus - Anterior view - the Corneal Reflex.

Lateral and Oblique views the Focus is on the corneal profile closest to the camera, i.e. the corneal para -sagittal plane.

ORBITAL TRAUMA; EYE LID LESIONS WITH SPREAD INTO THE PERIORBITAL REGION; EYE LIDS AND LID MARGINS; ENTROPION; ECTROPION; TRICHIASIS

SINGLE EYE WITH ADNEXA

- Anterior
- Right Lateral
- Left Lateral
- Additionally Oblique, Superior (“Birds Eye View”) or Inferior (“Worms Eye View”) may also be indicated
- Camera Axis is directed to the point where the Corneal Para-sagittal line meets the Interpupillary Line at the level of the Orbito-Helix Line.

The eyes are normally in the **Primary Position of Gaze**. The direction of gaze is used to bring an off-centred lesion to the centre of the field of view. This should conform to one of the **nine** defined **positions of gaze**. An off-centre lesion should additionally be routinely imaged anteriorly in the Primary Position. Upper and Lower Eye Lids must be retracted where indicated and the Upper lid must be everted for lesions on the conjunctival tarsus.

Reproduction Ratio **1:3 - 0.5metre (105mm focal length lens)** 16mm x 24mm
 1:2 - 0.4metre (105mm focal length lens) 24mm x 36mm

Image Orientation - Horizontal

Plane of Focus - The specific area of interest, i.e., periorbital; lids; internal (medial) or external (lateral) canthus; lacrimal punctum, & etc.

- This is a complimentary view to the **SINGLE EYE VIEW** and the **ORBITAL VIEW**.

TRAUMA TO THE GLOBE; CONJUNCTIVITIS; SCLERITIS; PIGMENTED LESIONS OF SCLERA AND CONJUNCTIVA; CORNEAL LESIONS; PTERYGIA; TRACOMA; TRICHIASIS; ENTROPION; ECTROPION; PERIORBITAL LESIONS AND LIDS; KERATOCONUS

SINGLE EYE

- Anterior
- Lateral
- Medial
- Oblique
- Superior ("Birds Eye View") Ectropion; or Inferior ("Worms Eye View") Entropion views may also be indicated
- The Superior ("Birds Eye View") is also indicated to record Proptosis and Keratoconus (Munson's Sign)
- Keratoconus will also require Slit-Lamp images of the corneal thickness.

Refer to **SECTION B. ANTERIOR SEGMENT SECTION.**

- Camera Axis is directed to the point where the Corneal Para-sagittal line meets the Interpupillary Line at the level of the Orbito-Helix Line.

The eye is normally in the **Primary Position of Gaze**. The direction of gaze is used to bring an off-centred lesion, i.e. a pterygium, to the centre of the field of view. This should conform to one of the **nine** defined **positions of gaze**. An off-centre lesion should additionally be routinely imaged anteriorly in the Primary Position. Upper and Lower Eye Lids must be retracted where indicated and the Upper lid must be everted for lesions on the conjunctival tarsus.

Reproduction Ratio 1:1.6 - 0.37metre (105mm focal length lens) 16mm x 24mm
1:1 - 0.31metre (105mm focal length lens) 24mm x 36mm

Image Orientation - Horizontal

Plane of Focus - The specific area of pathology or injury, i.e. Periorbital; Lids; Conjunctiva; Sclera; Cornea; Limbus (Corneo-Scleral Junction).

- This may be used as a supplementary view to the **SINGLE EYE WITH ADNEXA** if indicated and as an adjunct to Ophthalmic Photo-Slitlamp Microscope images.

SECTION B. ANTERIOR SEGMENT IMAGING STANDARDS

INTRODUCTION

The coverage of this section overlaps and may need to be used in conjunction with the **SECTION A. OCULO-PLASTIC** Guidelines, when the size of the lesion is too large for the ophthalmic slitlamp microscope.

These Guidelines assume the use of a dedicated Ophthalmic Photo Slit Lamp Microscope. Conventional lenses and cameras together with careful lighting techniques can be used to image some conditions in the Anterior Segment. Additionally, a Retinal Camera anterior segment setting can be used for imaging lens and corneal conditions using the Fundus Reflex or general views of the iris, conjunctiva and cornea provided the annular light reflex is positioned away from the pathology.

Because of the very varied pathology and locations, accurate standardisation is difficult to achieve with the normal "Photo Slit Lamp". Most instruments, however, have a means of standardising image magnification; slit width; slit height; slit angle; light intensity and background light intensity, allowing intra-patient standardisation. Inter-patient standardisation can be specified provided the anatomical structure and the exact pathology has been defined.

Image Magnification

In most cases high image magnifications must be sacrificed to achieve a greater "Depth of Field"; typical depth of field values range from 0.2 to 0.8 mm at 1.6x magnification at the imaging plane. Many workers have found this figure a workable compromise between magnification and depth of field bearing in mind the light available for recording a sharp image.

In these Guidelines the Magnification at the imaging plane has been standardised at 1.0/1.6x unless otherwise indicated.

Illumination and lighting angles are adjusted appropriately for modelling, with minimal reflections and to ensure reflections do not obscure important detail. Exposure intensity levels are set to provide maximum depth of field for all views.

Position of Gaze

The eye is normally in the **Primary Position of Gaze**. The direction of gaze is used to bring off-centre lesions such as pterygia to the centre of the field of view. This should conform to one of the **nine defined positions of gaze**. However, variations and reproducibility for 'follow-up' images must be considered for lesions which do not conform to any of the **nine positions**. For orientation, and as an aid to reproducibility, off-centre lesions should be routinely imaged in the **Primary Position**. Upper and Lower Eye Lids must be retracted where indicated and Upper Lids must be everted for lesions on the tarsal conjunctiva.

APPLICATION STANDARDS

ANTERIOR CHAMBER; AQUEOUS; IRIDOCORNEAL ANGLE

Aqueous Cells; Pigment; Flare

- Slit lamp beam set to a diameter of 0.1 - 1.0mm projected at 45° - 90° through the anterior chamber with the microscope at 90° to the light beam, background illuminator at low intensity or turned off.

Narrow Angle Glaucoma; Iris Lesions extending into the Angle

- Direct Focal coaxial illumination with Gonioscopy Lens
- Slit lamp beam set to maximum opening, maximum depth of field is essential.

Anterior Chamber Intra Ocular Lenses

- Slit lamp beam set to maximum opening, positioned appropriately to produce reflections from the lens, background illuminator.

Magnification at the imaging plane - 1.0x/1.6x

CONJUNCTIVITIS; SCLERITIS; PIGMENTED LESIONS OF SCLERA AND CONJUNCTIVA; GROSS CORNEAL LESIONS; PTERYGIA; TRACHOMA; PERIORBITAL LESIONS; ENTROPION; ECTROPION; TRACHIASIS; BLEPHARITIS; EYE LID LESIONS; TRAUMA

Wide Field General View - Diffuse Illumination

- Slit lamp with diffusion filter; slit beam set to maximum opening and positioned with the background illuminator to provide even wide field illumination
- Modelling of lesions can be introduced by varying the intensity ratio between the diffuse beam and the background illuminator.

Defined Field View - Direct Focal illumination

- Slit lamp beam set to maximum opening and positioned with the background illuminator to provide wide field illumination
- Modelling of lesions can be introduced by varying the intensity ratio between the slit lamp beam and the background illuminator
- Dark Field illumination may be required.

Surface Topography; Transillumination Views - Direct Focal illumination

- Slit lamp beam centred, set to 0.1 - 0.2 slit width, angled 30° - 45° across the lesion
- Background illuminator to provide wide field illumination.

Magnification at the imaging plane - 1.0x/1.6x

**CORNEAL THICKNESS; KERATOCONUS; CORNEAL ULCERS;
LESIONS OF CORNEAL EPITHELIUM AND ENDOTHELIUM;
CORNEAL DYSTROPHY; KERATITIS; BANDED KERATOPATHY;
CORNEAL TRAUMA; CORNEAL FOREIGN BODIES;
CORNEAL NEOPLASIA; CORNEAL OEDEMA**

Wide Field Corneal View - Diffuse Illumination

- Slit lamp with diffusion filter, slit beam set to maximum opening and positioned to provide even illumination, background illuminator
- Modelling of lesions can be introduced by varying the intensity ratio between the diffuse beam and the background illuminator.

Corneal Thickness; Keratoconus - Slit Beam Focal Illumination

- Slit lamp beam set to 0.1 - 0.2mm, positioned at approximately 90° to the Corneal surface to produce a light section through the pathology site, the microscope is angled at approximately 50° - 60° to the slit lamp beam, background illuminator
- The Superior ("Birds Eye View") can also be used to show the presence of Munson's Sign for Keratoconus.

Refer to: - SECTION A. OCULO-PLASTIC

Corneal Epithelium and Endothelium - Direct Focal illumination

- Slit lamp beam set to maximum opening, positioned appropriately for visualising the cornea with minimal reflections, background illuminator.

Keratic Precipitates; Pigment granules; Corneal Oedema; Epithelial Dystrophy - Defined Field Corneal View

- Slit lamp beam set to 4.0mm, positioned tangentially to separate the epithelium and endothelium at the site of the pathology, background illuminator
- Dark Field illumination may be required.

Keratic Precipitates; Pigment granules; Corneal Oedema; Epithelial Dystrophy; Corneal Thickness - Defined Field Corneal View - Slit Beam Focal Illumination

- Slit lamp beam set to 0.1 - 0.2mm, positioned at approximately 90° to the Corneal surface to produce a light section through the pathology site, the microscope is angled at approximately 50° - 60° to the slit lamp beam, background illuminator.

Dendritic Ulcer; Epithelial Cell loss

Direct Focal Fluorescence Illumination - Topical Sodium Fluorescein

- Slit lamp beam set to maximum opening with Excitation Filter only
- A control image without the Excitation Filter is required
- The background illuminator if fitted with an Excitation filter.

Perforated Corneal Ulcer - "Seidel Test"

Direct Focal Fluorescence Illumination - Topical Sodium Fluorescein

- Slit lamp beam set to maximum opening with Excitation Filter and Barrier Filter
- A control image without the Excitation and Barrier Filter is required.

Abnormal Epithelial Cells (Neoplasia)

Direct Focal illumination - Topical Lissamine Green

- Slit lamp beam set to maximum opening, background illuminator.

Special Note: - *Lissamine Green* replaces Rose Bengal which is no longer prepared for ophthalmic use.

Magnification at the imaging plane - 1.0x/1.6x

PIGMENTED LESIONS AND NON-PIGMENTED LESIONS OF THE IRIS; IRIS TUMOURS; IRIS TRAUMA; RUBEOSIS; IRIS NEOVASCULARISATION

All views must be imaged with an undilated pupil.

Wide Field General View - Diffuse Illumination

- Slit lamp with diffusion filter, slit beam set to maximum opening and positioned with the background illuminator to provide wide field illumination
- Surface modelling of lesions can be introduced by varying the intensity ratio between the diffuse beam and the background illuminator.

Defined Field Iris View - Direct Focal illumination

- Slit lamp beam set to maximum opening and positioned to provide surface modelling, background illuminator used to provide 'fill-in' illumination.

Iris lesions; Anterior Chamber Depth - Surface Topography and Transillumination

- Slit lamp beam set to 0.1 - 0.2mm, positioned approximately 90° to the plane of the Iris at the site of the pathology, the microscope is angled at approximately 60° - 90° to the slit lamp beam, background illuminator to provide 'fill-in' illumination.

***Iris Tumours; Rubeosis; Pupillary Tufts; Neovascularisation
- Fluorescein Angiography of the Iris and Limbus***

- Slit lamp and microscope fitted with appropriate excitation and barrier filters for IV Sodium Fluorescein
- Slit lamp beam set to maximum opening
- The angiography sequence must include the entire Arterio-Venous transit
- Images later than 3mins post injection usually provide little additional information
- A background illuminator fitted with an excitation filter may be used to increase the size of the illuminated area
- Colour control images are required pre injection.

Alternative Method – A retinal camera fitted for fluorescein angiography and set for anterior segment imaging can also be used.

***Essential Iris Atrophy; Ocular Albinism; Iris Pigment Layer defects;
Transillumination of the Iris - Coaxial Fundus Reflex Transillumination***

- Slit lamp beam set to a diameter of 1 - 2mm and positioned coaxially with the microscope in the centre of the pupil
- Background illuminator
- Partial mydriasis may be required in some conditions allowing an increase in the pupil diameter to provide more transilluminated light.

POSTERIOR CHAMBER – CILARY BODY; LENS; INTRA OCULAR LENSES

All views must be imaged through a fully dilated pupil if possible.

Ciliary Body Tumours readily visible through a dilated pupil

- Slit lamp beam set to maximum opening with the microscope near coaxial to the beam.

Ciliary Body Tumours not readily visible through a dilated pupil

- Slit lamp beam set to maximum opening and projected at about 60° into the Posterior Chamber with the microscope coaxial to the beam
- Rotation of the patient's head is necessary
- Scleral indentation may be required.

Magnification at the imaging plane - 1.0x/1.6x

Note:

The use of the Anterior Segment setting on a Retinal Camera may be indicated when Ciliary Body tumours cannot be visualised using a photo slit lamp. The camera is set at its smallest angle of view.

CATARACTS; ANTERIOR LENS CAPSULE OPACITIES; POSTERIOR LENS CAPSULE OPACITIES; LENS TRAUMA; INTRA OCULAR LENS IMPLANTS; ANTERIOR VITREOUS; LENTICONNUS

Wide Lens Field General View

- Slit lamp with diffusion filter, slit beam set to maximum opening at 30° to the microscope axis, background illuminator.

Direct Focal illumination Wide to Medium Beam

- Slit lamp beam set to 2.0 - 4.0mm, positioned 30° - 45°, background illuminator.

Direct Focal illumination Slit Beam

- Slit lamp beam set to 0.1 - 0.2mm, positioned 50° - 60°, background illuminator
- The beam is required to show the degree of convexity of the lens.

Direct Focal illumination Tangential Beam

- Slit lamp beam set to 2.0 - 6.0mm, positioned 50° - 60°, background illuminator.

Retro illumination - Fundus Reflex

- Slit lamp beam adjusted to approximately 4mm slit width and a height less than the diameter of the pupil
- The beam is “off set” to pass obliquely through the edge of the pupil opening
- The microscope is positioned centrally through the pupil.

Magnification at the imaging plane - 1.0x/1.6x

SECTION C. MEDICAL RETINA AND VITREO-RETINA IMAGING STANDARDS

INTRODUCTION

It is noted that International Standards/Guidelines for Retinal Imaging Fields are already established. The important standards are the “**Early Treatment of Diabetic Retinopathy Study**” (ETDRS) and the “**Age Related Eye Disease Study**” (AREDS 1 and AREDS 2).

The large number of International Drug Trials using **Colour Retinal Imaging**; **FFA**; **ICG**; and **OCT**, has resulted in “de facto” International Standards.

Similarly, Angiography Reading Centres such as DARC in New York; FPRC at Wisconsin; Moorfields Eye Hospital in London; and Bern Photographic Reading Centre in Switzerland, have all set their specific requirements.

In addition, the Optic Disc Reading Centre, University of California, San Diego has set the standards for colour stereo imaging of the **Optic Disc for Glaucoma**.

These protocols in general have been adopted for routine clinical use and for that reason they form the basis for the Guidelines in this section.

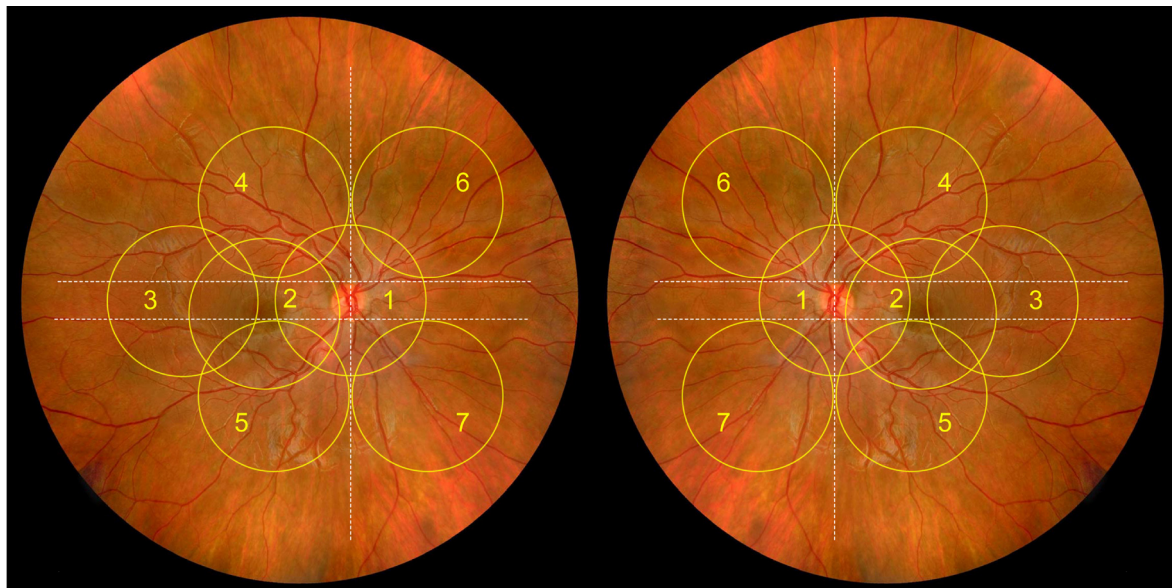


Figure 2 ETDRS 7 Field Survey 30°/35° – numbers indicate the imaging sequence - 50° fields should be based on the same position parameters and sequence

SPECIAL NOTES FOR INDOCYANINE GREEN ANGIOGRAPHY OF THE CHOROID

1. Increasingly the **Heidelberg Retinal Angiography HRA2** and the **Heidelberg Spectralis** are being used for angiography of the choroid with Indocyanine Green (**ICG**).
2. The use of Indocyanine Green for angiography and intravitreal surgery is contraindicated for patients who are allergic to fish or shellfish, or any compound containing iodine. Current literature suggests that a new iodine free compound "Infracyanine Green" (**IFCG**) (Laboratoires SERB, Paris, FRANCE) should replace Indocyanine Green. The literature also indicates "Infracyanine Green" can be used without any modification to existing procedures or protocols.

In these Guidelines the recommendations for **ICG** apply equally to **IFCG**.

NOTES REGARDING OPTICAL COHERENCE TOMOGRAPHY (OCT)

1. There are many systems in use throughout the U.K. Internationally, however, the preferred 'Gold Standard' is the **Zeiss Stratus®**; with over 6,000 systems installed world-wide. This Time Domain system has gained considerable clinical acceptance and has established itself as the 'bench mark' against which new units will be judged.

Guidelines can currently only be provided for the **Zeiss Stratus OCT**. Additional Guidelines may be developed for the newer **Spectral Domain/Fourier Domain OCT Systems** as these become accepted for general ophthalmic practice through clinical trials.

2. Operators of this equipment must be aware of the possible sources of **OCT** scan errors which can lead to misinterpretation and advise their clinicians of unreliable or unusable scans.

Scans must be checked for reliability and image quality using the Standard Thickness Deviation; Scan Placement; Scan Image; Signal Strength; Missing Data; and Analysis Confidence parameters, i.e. a fast macular thickness scan is considered acceptable when the Standard Deviation is $\leq 10\%$; scans $>10\%$ Standard Deviation should be repeated.

3. The **Zeiss Stratus Scan** acquisition protocols in the Guidelines are based on those used and recommended by the Bascom Palmer Eye Institute, Miami, USA.

4. **Safety Warning** relating to **OCT** by the US FDA states: -
"Never Scan an Eye for longer than 10 mins".

A similar warning appears in a tutorial programme from Eyetechnet.Net.

See BIBLIOGRAPHY for reference.

RETINAL MAP, FUNDUS MAP, RETINAL MOSAIC

This is the digital overlapping and blending of individual retinal images to produce a large single seamless retinal image. These images are useful during Pan Retinal Photocoagulation and also as information for patients with widespread retinal conditions. Most retinal imaging software provides a tool to produce these maps; Topcon “Auto Mosaic”; Zeiss Mosaic in Visupac.

Adobe Photoshop Version CS3 has a “Photo Merge” tool able to produce Retinal Maps.

APPLICATION STANDARDS

AGE RELATED MACULAR DEGENERATION – EXUDATIVE (WET) ARMD; AMD; Choroidal Neovascular Membrane - CNVM; Subretinal Neovascular Membrane – SRNVM; Choroidal New Vessels - CNV

Colour

- Bilateral Maculae, camera centred at the Fovea, 30°/35° camera field, stereo pairs recommended.

Autofluorescence

- Optional if available - Bilateral Maculae or Posterior Pole, camera centred at the Fovea, 50° camera field
- This should be carried out before performing a **FFA** or **ICG**
- A **Red Free** image should also be obtained at 50° camera field.

Red Free

- Bilateral Maculae, camera centred at the Fovea or Posterior Pole, 30°/35° camera field, stereo pairs recommended
- If an Autofluorescence image is being captured additionally provide a 50° camera field.

FFA (See Special Notes on next page)

- Indicated Macula, camera centred at the Fovea, 30°/35° camera field, stereo pairs recommended
- Exposures must include the complete Arterio-Venous transit; subsequently at 30secs; 40secs; 50secs; and 60secs
- Also, provide an image of the contra lateral eye using same camera field and centring between 60 and 90 secs
- Return to the target eye; make an image using the same parameters at 90secs
- At 2mins image both eyes; repeat at 5mins and 10mins using the same parameters.

Special Note 1: It is important **not** to alter the FFA flash intensity for the 60sec; 2min; 5min; and 10min images.

However, if 'blooming' occurs with loss of detail in areas of hyperfluorescence additional images with exposure compensation should be made, but care must taken to advise the clinician accordingly.

Special Note 2: It is particularly important **not** to alter the 30°/35° camera field during the angiography of any patient likely to be treated with "Photo Dynamic Therapy" ("PDT") : "Visudyne" : "Verteporfin".

ICG

- Useful for cases of **Occult CNVM** in delineating the areas of involved **Retinal Pigment Epithelium (RPE)**
- The usual procedure is starting early to record the complete choroidal filling phase then with images at 10 second intervals up to 60 secs; subsequently imaging at 2mins, 5mins, 10mins, 25mins; and with final images after all dye has left the retinal circulation, approximately 40mins post injection
- The **FFA** is usually performed between the 10min and the 25min ICG image using the same **FFA** procedure described above as a combined procedure.

OCT

- Bilateral Macular Scans using an Acquisition Protocol capable of producing individually captured High Resolution multi-angle scans to provide structural retinal detail and analysis
- Fast Acquisition Protocol with Low Resolution multi-angle scans as a single capture in less than 2 seconds to provide standardised reliable thickness measurements for long term analysis.

PHOTO-DYNAMIC THERAPY: VERTEPORFIN (VISUDYNE) - VPDT

Special Note: - In the UK two centres are running a national **VPDT Cohort Study**. The Central Angiographic Resource Facility (CARF), at the Ophthalmic Research Centre, Queen's University of Belfast/Royal Victoria Hospital, Belfast; and The London School of Hygiene & Tropical Medicine.

This Trial has been approved in the UK by the National Institute for Clinical Excellence (NICE).

Full information can be found at www.lshtm.ac.uk/hsru/vpdt/

AGE RELATED MACULAR DEGENERATION – NON-EXUDATIVE (DRY) Geographic Atrophy – GA; Drusen; Dry Macular Degeneration

Colour

- Bilateral Maculae, camera centred at the Fovea, 30°/35° camera field, stereo pairs recommended.

Autofluorescence

- Optional if available - Bilateral Maculae or Posterior Pole, camera centred at the Fovea, 50° camera field
- This should be carried out before performing a FFA or ICG
- A Red Free image should also be obtained with 50° camera field.

Red Free

- Bilateral Maculae, camera centred at the Fovea or Posterior Pole, 30°/35° camera field, stereo pairs recommended.
- If an Autofluorescence image is being captured additionally provide a 50° camera field.

FFA

- Only required when metamorphopsia indicates possible choroidal neovascularisation, i.e. **RPE** elevation; subretinal haemorrhage; exudates
- In these cases the Guidelines for **Exudative ARMD** should be used.

OCT

- Bilateral Macular Scans using an Acquisition Protocol capable of producing individually captured High Resolution multi-angle scans to provide structural retinal detail and analysis
- A Fast Acquisition Protocol with Low Resolution multi angle scans as a single capture in under 2 seconds to provide standardised reliable thickness measurements for long term analysis.

BIRDSHOT RETINOCHOROIDOPATHY – (VITILIGINOUS CHOROIDITIS)

Colour

- Bilateral indicated areas; camera centred at the areas indicated; 30°/35° camera fields; 50° camera fields may also be useful.

Red Free

- Bilateral indicated areas; camera centred at the areas indicated; 30/35° camera field; 50° camera fields may also be useful.

FFA

- Indicated area; camera centred at the Fovea or Posterior Pole or other areas as indicated; 30°/35° camera field
- Stereo pairs recommended
- Exposures must include the complete Arterio-Venous transit; subsequently at 30secs; 40secs; 50secs and 60secs
- Also provide a 50° camera field and an image of the contra lateral eye using appropriate camera fields and centring between 60 and 90 secs
- Return to the initial eye; make an image using the same parameters at 90secs
- At 2mins image both eyes; repeat at 5mins and 10mins using the same parameters.

ICG

- Rarely required – use procedure as for other “**White Dot Syndromes**”

BRANCH RETINAL ARTERY OCCLUSION - (BRAO)

Colour

For occlusions on or within the arcades: -

- Optic Disc, 30°/35° camera field
- Macula, 30°/35° camera field
- The occlusion quadrant including distal ischaemic area, 30°/35° camera field
- Stereo pairs recommended
- 50° and 20° camera fields may also be useful depending on the size of the occlusion and distance from the optic disc.

Contralateral eye: -

- Posterior pole, 30°/35° camera field
- Stereo pairs recommended.

For occlusions outside the arcades: -

- Camera field centred at the occlusion including distal ischaemic area, 30°/35° camera field
- 50° camera field may be necessary
- Stereo pairs recommended.

Red Free

- Camera centred at the occlusion - include distal ischaemic area
- The optic disc and macula must be included for occlusions within the arcades, 30°/35° camera field
- 50° camera field may be necessary
- Stereo pairs recommended
- This field should be the same as will be used for the **FFA**.

FFA

- Camera centred at the occlusion and to include distal ischaemic area
- The optic disc and macula must be included for occlusions within the arcades, 30°/35° camera field
- Stereo pairs recommended
- Exposures start early to include the choroidal filling and the complete Arterio Venous transit, then at 30secs; 40secs; 50secs; and 60secs
- Also provide an image of the posterior pole of the contralateral eye for occlusions within the arcades between 60 and 90secs
- Return to the initial eye; image the original field at 90secs
- At 2mins image both eyes
- Repeat at 5mins using the same parameters
- Look for collateral vessels, leakage and ischaemic areas beyond the occlusion.

OCT

- Required when the **FFA** indicates macular oedema
- Bilateral Macular Scans using an Acquisition Protocol capable of producing individually captured High Resolution multi-angle scans to provide structural retinal detail and analysis
- A Fast Acquisition Protocol with Low Resolution multi-angle scans as a single capture in less than 2 seconds to provide standardised reliable thickness measurements for long term analysis.

BRANCH RETINAL VEIN OCCLUSION - (BRVO)

Colour

For occlusions on or within the arcades: -

- Optic Disc, 30°/35° camera field
- Macula, 30°/35° camera field.

Contralateral eye: -

- Posterior pole, 30°/35° camera field
- Stereo pairs recommended.

For occlusions outside the arcades: -

- Camera field centred at the occlusion including distal ischaemic area, 30°/35° camera field
- 50° camera field may be necessary
- Stereo pairs recommended.

Red Free

- Camera centred at the occlusion - the optic disc and macula must be included 30°/35° camera field
- For occlusions outside the arcades, centred at the occlusion to include any distal ischaemic area, 30°/35° camera field
- 50° camera field may be necessary
- Stereo pairs recommended.

This field should be the same as will be used for the **FFA**.

FFA

- Camera centred at the occlusion and include the optic disc and macula, 30°/35° camera field
- Stereo pairs recommended
- Exposures must start early to include the choroidal circulation and the complete Arterio Venous transit, then at 30secs; 40secs; 50secs and 60secs
- Between 60 and 90 secs image the Posterior Pole of the contralateral eye using 30°/35° camera field
- Return to the affected eye at 90 secs and make an image using the same initial parameters
- At 2mins, image the Macula field and Optic Disc fields of the affected eye
- Record the Posterior Pole of the unaffected eye
- Return to the affected eye, change to 50° camera field and image outside the area of haemorrhage to establish the degree of ischaemia
- At 5mins revert to initial parameters; image the Macula, Optic Disc at 30°/35° camera field and the Posterior Pole of the contra-lateral eye
- For occlusions outside the arcades, centre on the occlusion using the same parameters as above but omitting the optic disc, macular and fields posterior pole fields
- Look for collateral vessels, leakage and ischaemic areas beyond the occlusion and area of haemorrhage.

OCT

- Bilateral Macular Scans using an Acquisition Protocol capable of producing individually captured High Resolution multi-angle scans to provide structural retinal detail and analysis
- Fast Acquisition Protocol with Low Resolution multi-angle scans as a single capture in less than 2 seconds to provide standardised reliable thickness measurements for long term analysis.

CENTRAL RETINAL VEIN OCCLUSION - (CRVO)

Colour

- Macula, 30°/35° camera field
- Optic Disc, 30°/35° camera field
- Stereo pairs recommended.

Contra lateral eye: -

- Posterior pole, 30°/35° camera field
- Stereo pairs recommended.

Red Free

- Posterior pole, 30°/35° camera field
- Stereo pairs recommended.

FFA

- Camera centred at Posterior Pole, 30°/35° camera field
- Stereo pairs recommended
- Exposures start early to include the choroidal flush and the complete Arterio Venous transit, then at 30secs; 40secs; 50secs; and 60secs
- Between 60 and 90 secs image the Posterior Pole of the contra-lateral eye using 30°/35° camera field
- Return to the affected eye at 90 secs and make an image using the same initial parameters
- At 2mins, image the Macula field and Optic Disc field of the affected eye
- Record the Posterior Pole of the contra lateral eye
- Return to the affected eye and change to 50° camera field and image the peripheral temporal and nasal fundus for ischaemia; look outside the area of haemorrhage to establish the degree of ischaemia
- At 5mins revert to initial parameters: image the Macula: Optic Disc at 30°/35° camera field and affected quadrants at 50°; and the Posterior Pole of the contralateral eye
- If macular oedema found provide images of the macula at 10mins.

OCT

- Bilateral Macular Scans using an Acquisition Protocol capable of producing individually captured High Resolution multi-angle scans to provide structural retinal detail and analysis
- Fast Acquisition Protocol with Low Resolution multi-angle scans as a single capture in less than 2 seconds to provide standardised reliable thickness measurements for long term analysis.

CENTRO SEROUS RETINOPATHY - (CSR); CHRONIC CSR

Colour

- Bilateral Maculae, camera centred at the Fovea or areas of serous detachment as indicated, 30°/35° camera field
- Stereo pairs recommended.

Red Free

- Bilateral Maculae, camera centred at the Fovea, 30°/35° camera field
- Stereo pairs recommended.

FFA

- Indicated Macula, camera centred at the Fovea or areas of serous detachment, 30°/35° camera field
- Stereo pairs recommended
- Exposures made to include the complete Arterio Venous transit, then at 30secs; 40secs; 50secs; and 60secs
- Also provide an image of the contra lateral eye using same camera field and centring between 60 and 90 secs
- Return to the initial eye, make an image using the same parameters at 90secs
- At 2mins image both eyes using the 30° and 50° camera fields
- Repeat at 5mins and 10mins using the same parameters.

Special Note: It is not uncommon to find multiple CSR lesions in the affected eye and also lesions in an apparently unaffected fellow eye. Both eyes should be searched after the 2min images for hyperfluorescent lesions. **If found**, record with **Colour**, **Red Free** and **FFA** and subsequently at 5mins and 10mins.

ICG

- Helpful in cases of multiple and **chronic CSR** in delineating the areas of involved **RPE**
- The usual procedure is starting early with images at 10 second intervals up to 60 secs after the complete choroidal filling phase
- Subsequently imaging at 2mins; 5mins; 10mins; 25mins
- With final images after all dye has left the retinal circulation, approximately 40mins post injection
- The **FFA** is usually performed between the 10min and 25min ICG images using the same **FFA** procedure described above as a combined procedure.

OCT

- Bilateral Macular Scans using an Acquisition Protocol capable of producing individually captured High Resolution multi-angle scans to provide structural retinal detail and analysis
- Fast Acquisition Protocol with Low Resolution multi-angle scans as a single capture in less than 2 seconds to provide standardised reliable thickness measurements for long term analysis.

CHOROIDAL TUMOURS AND CHOROIDAL NAEVI; CHOROIDAL METASTASES, 2° Deposits

Colour

- Document location, size and surface detail
- It is essential to record all borders with a clear margin of normal choroid this is particularly important with lesions larger than the camera's widest field of view, i.e. >50/60°
- Stereo pairs recommended
- The optic disc should be included in at least one image to provide a size reference
- These views must be repeatable over a long period of time with the same or at least the same model Retinal Camera.

Special Note: The use of the Panoret 1000 130° field of view Retinal Camera for Adults is now becoming relatively wide-spread particularly in Ophthalmic Centres with Ocular Oncology specialist divisions. If this camera is available it is a preferred option for large choroidal tumours/naevi and would be additional to some of the conventional camera views. This camera does not replace the "Retcam" for Children with Retinoblastoma.

Red Free

- May be helpful to differentiate the borders using the same size/location parameters as for the colour images.

Green Free

- If available this is very useful to record the borders of any pigmented lesion
- Green Free can be achieved by using only the Red **ICG** Exciter Filter on a retinal camera designed for **ICG**.

FFA

May be helpful to differentiate Nevi; Melanomas; and Haemangiomas, however, current ophthalmic practice makes more use of High Resolution Ultrasound to provide accurate lesion measurements.

- Camera centred on the tumour/naevus, camera field selected to cover all borders with one clear margin of normal choroid - stereo pairs
- Where the lesion is larger than the widest camera angle ensure one border, and its clear margin of choroid, is included in the field
- Exposures made to include the complete Arterio Venous phase; then at 30secs; 40secs; 50secs; 60secs; 90secs; 2mins; and 5mins
- Extend to 10mins if Haemangioma is suspected
- With elevated lesions differential focussing between the overlying retinal detachment, the body of the lesion, and its base is necessary during angiography.

COATS' DISEASE

Colour

- Bilateral Maculae, camera centred at the Fovea and/or area of Serous Detachment, 30°/35° or 50° camera field depending on size of the lesion
- Multiple images may be required to cover the detached area
- Stereo pairs recommended.

Red Free

- Bilateral Maculae camera centred at the Fovea and/or area of Serous Detachment, 30°/35° or 50° camera field depending on size of the detachment and hard exudate.

FFA

- Camera centred to include the Fovea and area of Serous Detachment, 30°/35° or 50° camera field depending on size of the lesion
- Multiple images may be required to cover the detached area
- Exposures include the complete Arterio Venous transit; subsequently at 30secs; 40secs; 50secs; and 60secs
- Also provide an image of the macular of the contra lateral eye using same camera field after 60secs
- At 90secs return to the target eye and depending on size of the lesion, multiple images may be required to cover the area of the detachment, hard exudate and ischaemia
- At 2mins image both eyes; repeat at 5mins and 10mins using the same parameters.

OCT

Useful where there are signs of Macular Oedema.

- Bilateral Macular Scans using an Acquisition Protocol capable of producing individually captured High Resolution multi-angle scans to provide structural retinal detail and analysis
- Fast Acquisition Protocol with Low Resolution multi-angle scans as a single capture in less than 2 seconds to provide standardised reliable thickness measurements for long term analysis.

**CYSTOID MACULAR OEDEMA - (CMO);
CLINICALLY SIGNIFICANT MACULAR OEDEMA – (CSMO);
EPI-RETINAL MEMBRANES – (ERM);
FULL THICKNESS MACULAR HOLES; LAMELLA HOLES;
PSEUDO HOLES; MACULAR DYSTROPHY;
MACULAR DISEASE NOT OTHERWISE SPECIFIED**

Colour

- Bilateral Maculae, camera centred at the Fovea, 30°/35° camera field
- Stereo pairs recommended.

Red Free

- Bilateral Maculae, camera centred at the Fovea, 30°/35° camera field
- Stereo pairs recommended.

FFA

- Indicated Macula, camera centred at the Fovea, 30°/35° camera field - stereo pairs
- Exposures made to include the complete Arterio Venous transit; then at 30secs; 40secs; 50secs; and 60secs
- Also provide an image of the contra lateral eye using same camera field and centring between 60 and 90 secs
- Return to the initial eye; make an image using the same parameters at 90secs
- At 2mins image both eyes using the same parameters
- Repeat at 5mins and 10mins.

OCT

- Bilateral Macular Scans using an Acquisition Protocol capable of producing individually captured High Resolution multi-angle scans to provide structural retinal detail and analysis
- Fast Acquisition Protocol with Low Resolution multi-angle scans as a single capture in less than 2 seconds to provide standardised reliable thickness measurements for long term analysis.

DIABETIC MACULOPATHY

Colour

- Bilateral Maculae, camera centred at the Fovea, 30°/35° camera field
- Bilateral Posterior Poles, 50° camera field
- Stereo pairs recommended.

Red Free

- Bilateral Maculae, camera centred at the Fovea, 30°/35° camera field
- Bilateral Posterior Poles, 50° camera field
- Stereo pairs recommended.

FFA

- Indicated Macula, camera centred at the Fovea, 30°/35° camera field
- Stereo pairs recommended
- Exposures made to include the complete Arterio Venous transit; then at 30secs; 40secs; 50secs; and 60secs
- Change to 50° camera field and image the Posterior Pole
- Also provide an image of the contra lateral eye, using same camera field/fields and centring between 60 and 90 secs
- Return to the initial eye and image the macula using 30°/35° field at 90secs
- At 2 mins, image both maculae using a 30°/35° field and the Posterior Pole at 50° - visually scan the retinal mid periphery for hyperfluorescence and ischaemia; if present proceed to a bilateral **FFA modified EDTDR 7 Field Survey** using 50° camera fields
- Image both maculae with 30°/35° field and the Posterior Poles at 50° at 5mins and 10 mins post injection.

OCT

- Bilateral Macular Scans using an Acquisition Protocol capable of producing individually captured High Resolution multi-angle scans to provide structural retinal detail and analysis
- Fast Acquisition Protocol with Low Resolution multi-angle scans as a single capture in less than 2 seconds to provide standardised reliable thickness measurements for long term analysis.

DIABETIC RETINOPATHY

Colour

- Bilateral modified **EDTR 7 Field Retinal Survey** using 50° camera fields
- Additionally, include bilateral 30°/35° camera fields centred at the Fovea
- Stereo pairs recommended
- Also additional views of vitreoretinal fibrous bands, scarring and traction membranes may be necessary
- A **Fundus Reflex** view should be imaged in cases of significant lens opacity.

Red Free

- Bilateral Maculae, 30°/35° camera field of maculae and 50° camera fields of the Posterior Poles
- Stereo pairs recommended.

FFA

- Indicated Macula, camera centred at the Fovea, 30°/35° camera field
- Stereo pairs recommended
- Exposures made to include the complete Arterio Venous transit; then at 30secs; 40secs; 50secs; and 60secs
- Change to 50° camera field and image the Posterior Pole
- Also provide images of the contra lateral eye using same camera field/fields and centring between 60 and 90 secs
- Return to the initial eye and image the macula using 30°/35° field at 90secs
- At 2 mins, image both maculae using a 30°/35° field and the Posterior Poles at 50°
- Proceed to a bilateral **FFA Survey** using 50° camera fields
- Image both maculae with 30°/35° field and the Posterior Poles at 50° at 5mins and 10 mins post injection.

OCT

- Bilateral Macular Scans using an Acquisition Protocol capable of producing individually captured High Resolution multi-angle scans to provide structural retinal detail and analysis
- Fast Acquisition Protocol with Low Resolution multi-angle scans as a single capture in less than 2 seconds to provide standardised reliable thickness measurements for long term analysis.

DIABETIC RETINOPATHY SCREENING AND MONITORING

National Guidelines issued by the Department of Health - England and Wales
"National Screening Programme for Diabetic Retinopathy Screening"
(www.nscretinopath.org.uk)

Guidelines produced by NHS Quality Improvement Scotland.
"Clinical Standards March 2004 - Diabetic Retinopathy Screening"
National Guidelines issued by Ministry of Health – New Zealand
"National Diabetes Retinal Screening Guidelines – 2006".
(www.moh.govt.nz)

Special Note: - Photographers working in Diabetic Retinopathy Screening and monitoring in the UK will need City and Guilds Certification, as this is a mandatory requirement for accreditation to practice.
(www.drscertificate.org.uk)

HYPERTENSIVE RETINOPATHY – MALIGNANT HYPERTENSION

Colour

- Bilateral Maculae, 30°/35° camera fields centred at the Fovea
- Stereo pairs recommended
- And if indicated the supro-temporal, infro-temporal quadrants and Posterior Pole using 50° camera fields.

Red Free

- Bilateral Maculae, 30°/35° camera field of maculae
- 50° camera fields of the Posterior Poles.

FFA - rarely required

- Camera centred at the Posterior Pole, 30°/35° camera field - stereo pairs
- Exposures made to include the complete Arterio Venous transit, then at 30secs; 40secs; 50secs; and 60secs
- Change to 50° camera field and image both Posterior Poles
- Also provide an image of the contra lateral Posterior Pole 50°; camera field between 60 and 90 secs
- Return to the initial eye and image the Posterior Pole using 30°/35° field at 90secs, 2 mins and 5 mins - image both Posterior Poles using 30°/35° camera fields.

OCT – Only required if macular oedema suspected

- Bilateral Macular Scans using an Acquisition Protocol capable of producing individually captured High Resolution multi-angle scans to provide structural retinal detail and analysis
- Fast Acquisition Protocol with Low Resolution multi-angle scans as a single capture in less than 2 seconds to provide standardised reliable thickness measurements for long term analysis.

MYOPIC MACULAR DEGENERATION – LACQUER CRACKS; STAPHYLOMATA

Colour

- Bilateral Maculae, camera centred at the Fovea, 30°/35° camera field
- Stereo pairs recommended.

Autofluorescence

Optional if available –

- Bilateral Maculae or Posterior Pole, camera centred at the Fovea, 50° camera field
- This should be carried out before performing a **FFA** or **ICG**
- A **Red Free** image should also be obtained at 50° camera field.

Red Free

- Bilateral Maculae, camera centred at the Fovea or Posterior Pole, 30°/35° camera field
- Stereo pairs recommended
- If an Autofluorescence image is being captured additionally provide a 50° camera field.

FFA

- Indicated Macula, camera centred at the Fovea, 30°/35° camera field
- Stereo pairs recommended
- Exposures must include the complete Arterio Venous transit; subsequently at 30secs; 40secs; 50secs; and 60secs
- Also provide an image of the contra lateral eye using same camera field and centring between 60 and 90 secs
- Return to the target eye; make an image using the same parameters at 90secs
- At 2mins image both eyes; repeat at 5mins and 10mins using the same parameters.

ICG

This is useful for cases with deficient choroidal circulation, revealing **CNVs** hidden by sub retinal haemorrhage and in delineating the areas of involved **RPE**.

- The usual procedure is starting early to record the complete choroidal filling phase then with images at 10 second intervals up to 60 secs
- Subsequently imaging at 2mins; 5mins; 10mins; 25mins; and with final images after all dye has left the retinal circulation, approximately 40mins post injection
- The **FFA** is usually performed after the 10min and before the 25min **ICG** image using the same procedure described above as a combined procedure.

OCT

- Bilateral Macular Scans using an Acquisition Protocol capable of producing individually captured High Resolution multi-angle scans to provide structural retinal detail and analysis
- Fast Acquisition Protocol with Low Resolution multi-angle scans as a single capture in less than 2 seconds to provide standardised reliable thickness measurements for long term analysis.

OCULAR DRUG TOXICITY - RETINAL SCREENING AND MONITORING

1. Patients being treated with Chloroquine ('Nivaquin'); Hydroxychloroquine; ('Plaquenil') - long term treatment on $\geq 200\text{mg/day}$ for minimum of 5 years.

Colour

- Bilateral Maculae, camera centred at the Fovea, 30°/35° camera field
- Stereo pairs recommended

2. Patients being treated with Desferroxyamine

Colour

- Bilateral Posterior Poles, camera centred at the Posterior Pole, 30°/35° camera field
- Stereo pairs recommended

References

1. Ocular Toxicity and Hydroxychloroquine: Guidelines for screening 2004 (replacing The Royal College of Ophthalmologists Guidelines 1998) RCOph. UK.
www.rcophth.ac.uk/docs/publications/OcularToxicity2004.pdf
2. Recommendations on screening for Chloroquine and Hydroxychloroquine Retinopathy. American Academy of Ophthalmology.
www.aao.org/education/library/statements

POLYPOIDAL CHOROIDOPATHY

Colour

- Bilateral Maculae, camera centred at the Fovea
- Posterior Pole or other areas as indicated
- 30°/35° and 50° camera fields.

Red Free

- Bilateral Maculae, camera centred at the Fovea
- Posterior Pole or other areas as indicated
- 30°/35° and 50° camera fields.

FFA

- Indicated area, camera centred at the Fovea or Posterior Pole or other areas as indicated, 30°/35° camera field
- Stereo pairs recommended
- Exposures must include the complete Arterio-Venous transit; subsequently at 30secs; 40secs; 50secs; and 60secs
- Also provide a 50° camera field and an image of the contra lateral eye using same camera fields and centring between 60 and 90 secs
- Return to the initial eye; make an image using the same parameters at 90secs
- At 2mins image both eyes; repeat at 5mins and 10mins using the same parameters.

ICG

- Useful to distinguish from **AMD CNVs** and to reveal multiple polyps not seen on the **FFA**, 50° camera field
- The usual procedure is starting early to record the complete choroidal filling phase then with images at 10 second intervals up to 60 secs
- Subsequently imaging at 2mins; 5mins; 10mins; 25mins; and with final images after all dye has left the retinal circulation, approximately 40mins post injection
- The **FFA** is usually performed after the 10min and before the 25min **ICG** image using the same procedure described above as a combined procedure.

OCT

- Bilateral Macular Scans using an Acquisition Protocol capable of producing individually captured High Resolution multi-angle scans to provide structural retinal detail and analysis
- Fast Acquisition Protocol with Low Resolution multi-angle scans as a single capture in less than 2 seconds to provide standardised reliable thickness measurements for long term analysis.

PRESUMED OCULAR HISTOPLASMOSIS – (POHS)

Colour

- Bilateral indicated areas, camera centred at the areas indicated - 30°/35° camera fields
- 50° camera fields may also be useful.

Red Free

- Bilateral indicated areas, camera centred at the areas indicated - 30/35° camera fields
- 50° camera fields may also be useful.

FFA

- Indicated area, camera centred at the Fovea or Posterior Pole or other areas as indicated, 30°/35° camera field
- Stereo pairs recommended
- Exposures must include the complete Arterio-Venous transit; subsequently at 30secs; 40secs; 50secs; and 60secs
- Also provide a 50° camera field and an image of the contra lateral eye using same camera fields and centring between 60 and 90 secs
- Return to the initial eye; make an image using the same parameters at 90secs
- At 2mins image both eyes - repeat at 5mins and 10mins using the same parameters.

RETINAL MACROANEURYSM

Colour

- Camera centred on the Macroaneurysm, 30°/35° camera field
- Stereo pairs recommended.

Red Free

- Camera centred on the Macroaneurysm, 30°/35° camera field
- Stereo pairs recommended.

FFA

- Camera centred on the Macroaneurysm, 30°/35° camera field
- Stereo pairs recommended
- Exposures made to include the complete Arterio Venous transit; then at 30secs; 40secs; 50secs; 60secs; 90secs; 2mins; 5mins and 10mins

ICG

- Helpful to differentiate from **Exudative ARMD**
- Use 50° camera field
- The usual procedure is starting early to record the complete choroidal filling phase then with images at 10 second intervals up to 60 secs
- Subsequently imaging at 2mins; 5mins; 10mins; 25mins; and with final images after all dye has left the retinal circulation, approximately 40mins post injection
- The **FFA** is usually performed after the 10min and before the 25min **ICG** image using the same procedure described above as a combined procedure.

RETINITIS PIGMENTOSA; RETINAL DYSTROPHIES; ROD/CONE DYSTROPHY

Colour

- Bilateral Retinae, camera centred at the Posterior Pole, 30°/35° and 50° camera fields
- Far and Mid periphery; Temporal; Nasal; Superior and Inferior quadrants in both eyes should be scanned for typical areas and documented using a 50° camera field.

Special Note: - The use of the Panoret 1000 130° field of view Retinal Camera for Adults is now becoming relatively wide-spread particularly in Ophthalmic Centres with Ocular Oncology specialist divisions. The use of this camera system is now a preferred option for Retinitis Pigmentosa and other Retinal Dystrophies and this would be additional to some of the conventional camera views.

STARGARDT'S DISEASE; JUVENILE MACULAR DEGENERATION

Colour

- Bilateral Maculae, camera centred at the Fovea, 30°/35° camera field
- Stereo pairs recommended
- Mid periphery in both eyes should be scanned for lesions and documented using a 50° camera field.

Autofluorescence

- Optional if available - Bilateral Maculae, camera centred at the Fovea, 30°/35° camera field
- Lesions identified in the mid peripheral colour images should be imaged for autofluorescence with 50° fields. This should be carried out before the **FFA** or **ICG**.

FFA

- Indicated Macula, camera centred at the Fovea, 30°/35° camera field
- Stereo pairs recommended
- Exposures must include the complete Arterio Venous transit; subsequently at 30secs; 40secs; 50secs; and 60secs
- Also provide an image of the contra lateral eye using same camera field and centring between 60 and 90 secs; return to the initial eye, make an image using the same parameters at 90secs. At 2mins image both eyes; repeat at 5mins and 10mins using the same parameters.

ICG

- May be useful; the fundus flavimaculatus 'fleck-like lesions' block the choroidal fluorescence
- The usual procedure is starting early to record the complete choroidal filling phase then with images at 10 second intervals up to 60 secs
- Subsequently imaging at 2mins; 5mins; 10mins; 25mins; and with final images after all dye has left the retinal circulation, approximately 40mins post injection
- The **FFA** is usually performed between the 10min and 25min ICG images using the same **FFA** procedure described above as a combined procedure.

OCT

- Bilateral Macular Scans using an Acquisition Protocol capable of producing individually captured High Resolution multi-angle scans to provide structural retinal detail and analysis
- Fast Acquisition Protocol with Low Resolution multi-angle scans as a single capture in less than 2 seconds to provide standardised reliable thickness measurements for long term analysis.

VOGT-KOYANAGI-HARADA SYNDROME - VKH.

Colour

- Bilateral Retinae, camera centred at the Posterior Pole, 30°/35° and 50° camera fields
- Stereo pairs recommended
- Mid periphery in both eyes should be scanned for lesions and documented.

Red Free

May be helpful to determine oedematous hyperaemic optic neuritis.

FFA

- Indicated eye, camera centred at the Posterior Pole, 30°/35° camera field
- Stereo pairs recommended
- Exposures must include the complete Arterio Venous phase; subsequently at 30secs; 40secs; 50secs; and 60secs
- Also provide an image of the contra lateral eye using same camera field and centring between 60 and 90 secs
- Return to the initial eye; make an image using the same parameters at 90secs
- At 2mins image both eyes and the mid periphery in both eyes should be scanned for lesions and documented using a 50° camera field
- Repeat the Posterior Pole views at 5mins and 10mins using the same parameters.

OCT

- Bilateral Macular Scans using an Acquisition Protocol capable of producing individually captured High Resolution multi-angle scans to provide structural retinal detail and analysis
- Fast Acquisition Protocol with Low Resolution multi-angle scans as a single capture in less than 2 seconds to provide standardised reliable thickness measurements for long term analysis.

WHITE DOT SYNDROMES

**ACUTE MULTIFOCAL POSTERIOR PLACOID PIGMENT
EPITHELIOPATHY (AMPPE), (APMPPE);
MULTIPLE EVANESCENT WHITE DOT SYNDROME (MEWDS);
MULTIFOCAL CHOROIDITIS AND PANUVEITIS (MCP);
PUNCTATE INNER CHOROIDITIS (PIC);
DIFFUSE SUBRETINAL FIBROSIS (DSF)**

The White Dot Syndromes are a group of idiopathic multifocal inflammatory conditions involving the retina and choroid. Presumed Ocular Histoplasmosis (POHS) and Birdshot Retinochoroidopathy are additional non-inflammatory Syndromes producing White Dots involving the retina and choroid; the Standards for these will be found under their respective names.

Colour

- Bilateral Maculae, camera centred at the Fovea or Posterior Pole or other areas as indicated, 30°/35° and 50° camera fields
- Stereo pairs recommended.

Autofluorescence

- Optional if available - Bilateral Maculae, camera centred at the Fovea or Posterior Pole or other areas as indicated, 50° camera field
- This should be carried out before performing a **FFA** or **ICG**
- A **Red Free** image should also be obtained at 50° camera field.

Red Free

- Bilateral Maculae, camera centred at the Fovea or Posterior Pole or other areas as indicated, 30°/35° and 50° camera fields
- Stereo pairs recommended.

FFA

- Indicated area, camera centred at the Fovea or Posterior Pole or other areas as indicated, 30°/35° camera field
- Stereo pairs recommended
- Exposures must include the complete Arterio-Venous transit
- Subsequently at 30secs; 40secs; 50secs; and 60secs
- Also provide a 50° camera field and an image of the contra lateral eye using appropriate camera fields and centring between 60 and 90 secs
- Return to the initial eye, make an image using the same parameters at 90secs
- At 2mins image both eyes; repeat at 5mins and 10mins with same fields.

ICG

- Useful for delineating the areas of involved **RPE**
- The usual procedure is starting early to record the complete choroidal filling phase then with images at 10 second intervals up to 60 secs
- Subsequently imaging at 2mins; 5mins; 10mins; 25mins; and with final images after all dye has left the retinal circulation, approximately 40mins post injection
- The **FFA** is usually performed after the 10min and before the 25min ICG image using the same procedure described above as a combined procedure.

OCT

Bilateral Macular Scans using an Acquisition Protocol capable of producing individually captured High Resolution multi-angle scans to provide structural retinal detail and analysis

Fast Acquisition Protocol with Low Resolution multi-angle scans as a single capture in less than 2 seconds to provide standardised reliable thickness measurements for long term analysis.

SECTION D. GLAUCOMA IMAGING STANDARDS

APPLICATION STANDARDS

ANTERIOR SEGMENT - DRAINAGE BLEBS; TRABECULECTOMY SITES; MOLTENO TUBES

Wide Field General View

- Slit lamp with diffusion filter
- Slit beam set to maximum opening
- Positioned to provide wide field illumination, background illuminator.

Direct Focal illumination

- Slit lamp beam set to maximum opening, background illuminator.

Anterior Chamber Depth

- Slit lamp beam width set to 0.1 - 0.2mm, positioned approximately 90° to the plane of the Iris
- The microscope is angled at approximately 60° - 90° to the slit lamp beam, background illuminator.

Trabeculectomy Sites - Transillumination of the Iris

Direct Focal Coaxial Fundus Reflex transillumination

- Slit lamp beam set to a diameter of 1 - 2mm and positioned coaxially with the microscope in the centre of the pupil
- Background illuminator at low intensity.

PRIMARY CLOSED ANGLE GLAUCOMA

Iridocorneal Angle - Direct Focal coaxial illumination with Gonioscopy Lens

- Slit lamp beam set to maximum opening
- Maximum depth of field is essential.

Anterior Segment OCT

- Heidelberg SL-OCT
- Zeiss Visante OCT
- Zeiss GDx Scanning Laser Polarimeter
- Oculus PentaCam

**OPTIC DISC - RAISED INTEROCULAR PRESSURE;
GLAUCOMATOUS OPTIC NEUROPATHY; DISC ASYMMETRY;
OPTIC CUP DEPTH; PHYSIOLOGICAL CUPPING;
NOTCHING OR THINNING OF NEURORETINAL RIM “ISNT”;
DISC HAEMORRAGES;
ACQUIRED PIT OF THE OPTIC NERVE “APON”;
PRIMARY OPEN ANGLE GLAUCOMA - POAG**

Colour

- Bilateral Optic Discs, camera centred on the Optic Disc, 30° and 20° camera field of each disc - stereo pairs
- With the 30° camera field images focus critically on the point where the small blood vessels cross the edge of the cup
- With 20° camera field, focus the first image of the stereo pair critically on the point where the small blood vessels cross the edge of the cup
- With the second image focus deeper to provide more detail of the lamina cribrosa
- Check the images for **Retinal Nerve Fibre Layer Loss**; if present apply the specific guidelines below. (See Page 48)

OCT

- Bilateral scans of the optic discs using a Fast Acquisition Scan to provide quantitative evaluation of the optic disc size; rim volume and area; cup size; and cup to disc ratios.

HRT

- Bilateral scans are obtained using the standardised parameters built-in to the **Heidelberg Retinal Tomograph HRT3**
- After acquisition of the initial data a Contour Line is drawn to outline the optic disc margin for each image. This provides a Progressive Analysis using the **HRT** software protocols.

RETINAL NERVE FIBRE LAYER LOSS (RNFL)

Colour

- Bilateral Optic Discs, using routine for **Optic Discs**
- Camera centred on the Optic Disc, 30°/35° and 20° camera field of each disc - stereo pairs
- With both camera fields focus critically on the small blood vessels in the parapapillary region.

Red Free

- Bilateral Optic Discs, camera centred at the centre of the Disc, 30°/35° and 20° camera field - stereo pairs
- Focus on the **Retinal Nerve Fibre Layer (RNFL)**
- Should match the colour images of the **Optic Discs**.

OCT

- Bilateral Scans centred on the **Optic Disc** using a '**Fast RNFL Thickness**' Acquisition Protocol for comparison with the appropriate normative database.

SECTION E. PAEDIATRIC OPHTHALMOLOGY IMAGING STANDARDS

INTRODUCTION

This Section utilises Guidelines from all of the previous sections as they relate to the child. Methods must be established to adapt or modify the Adult equipment to cater for children.

SPECIAL NOTE: - Sodium Fluorescein doses for fluorescein angiography in children must be based on the child's body weight and drug concentration. (8mg/kg body weight) Consult the appropriate Pharmacopeia for the particular product being used.

APPLICATION STANDARDS

The following conditions are specific to the Paediatric patient.

PRE-AMBLYOPIC SIGNS IN INFANTS

- A number of Infant Screening Systems are available to detect refractive errors and strabismus. These should be used strictly in accordance with their operating protocols.

STRABISMUS

- The "Squint Set"; "Distant" and "Near" fixation
- Care must be taken to record positional compensation
- A "Head and Shoulders" view is an essential part of the "Squint Set"
- The use of Digital Video is a valuable technique for recording Squints.

Note: Use **SECTION A. OCULO-PLASTIC IMAGING STANDARDS**

RETINOBLASTOMA using standard retinal cameras

Colour

- Document location, size and surface detail
- It is essential to record all borders, satellites and seeds at the camera's widest field of view.
- Wherever possible the optic disc should be included in one view to provide a reference.
- These views must be repeatable over a long period of time with the same or at least the same model Retinal Camera.
- These elevated lesions require differential focussing between the top, body and base of the tumour or tumours and vitreous seeds.
- Adjust recording exposures to cope with the long range of reflectance values. Scleral indentation is necessary.

FFA

- Helpful to differentiate retinoblastoma from other lesions
- Camera centred on the primary lesion
- Camera field selected to cover all borders with a clear margin of normal choroid
- Exposures must be made **as soon as** the Fluorescein has been injected and continued to include the complete Arterio Venous transit; then at 30secs; 40secs; 50secs; 60secs; 90secs; and 2mins
- With these elevated lesions differential focusing between the top, body and base of the tumour is necessary during the angiogram.

Note: - The fluorescein dose must be based on the child's body weight/mg.

RETINOBLASTOMA using 'RETCAM' or other dedicated Wide Angle cameras

Colour

- Document location, size and surface detail
- It is essential to record all borders, satellites and seeds using the 'Children's' lens
- The optic disc must be included in at least one view to provide a reference - images should overlap
- Views captured must be repeatable over a long period of time, use the Retcam's built-in system for standardisation and comparison
- These elevated lesions require differential focussing between the top, body and base of each tumour
- Adjust Recording exposures to cope with the long range of reflectance values
- Scleral indentation is necessary.

FFA (this may not be fitted to all cameras)

- Helpful to confirm retinoblastoma
- Camera centred on the primary lesion, camera field selected to cover all borders with a clear margin
- Exposures must be made as soon as the Fluorescein has been injected and continued to include the complete Arterio Venous phase, then at 30secs; 40secs; 50secs; 60secs; 90secs; and 2mins
- With these elevated lesions differential focussing between the top, body and base of the tumour is necessary during the angiogram.

Note: - The fluorescein dose must be based on the child's body weight.

RETINOPATHY OF PREMATURITY (ROP)

Using 'RETCAM' or other dedicated camera

Colour

- Document using the '**ROP 120°**' lens
- Views captured must be repeatable over a long period of time, use the Retcam's built-in system for standardisation and comparison, images should overlap
- Adjust Recording exposures to cope with the long range of reflectance values.

SHAKEN BABY SYNDROME – NON ACCIDENTAL INJURY (NAI)

Using 'RETCAM' or other dedicated camera

Colour

- Document the distribution, location, and size of haemorrhages (Roth's Spots) using the 'Children's' lens
- The optic disc must be included in at least one view per eye to provide a reference - images should overlap
- Adjust Recording exposures to cope with the range of reflectance values
- Both eyes must be imaged
- Precautions in terms of archiving and identification of digital **Medico-Legal Forensic Evidence** must be observed
- Images of 'normal' retinae of a child of similar age may need to be also produced as evidence.

NOTE: - Other clinical photography may be required to document evidence of non-ophthalmic injury. This should conform to **SECTION A. OCULOPLASTIC IMAGING STANDARDS** and any other **IMI National Guidelines** that cover these aspects of Clinical Photography.

GENETIC DISORDERS

MACULAR DYSTROPHIES

Colour

- Bilateral Maculae, camera centred at the Fovea, 30°/35° camera field
- Stereo pairs recommended.

Red Free

- Bilateral Maculae, camera centred at the Fovea, 30°/35° camera field
- Stereo pairs recommended.

FFA

- Indicated Macula, camera centred at the Fovea, 30°/35° camera field - stereo pairs
- Exposures must include the complete Arteriovenous phase, subsequently at 30secs; 40secs; 50secs and 60secs
- Also provide an image of the contra lateral eye using same camera field and centring between 60 and 90 secs
- Return to the initial eye, make an image using the same parameters at 90secs
- At 2mins image both eyes; repeat at 5mins and 10mins using the same parameters.

RETINITIS PIGMENTOSA; RETINAL DYSTROPHIES; USHER'S SYNDROME

Colour

- Bilateral Retinae, camera centred at the Posterior Pole, 30°/35° and 50° camera fields
- Far and Mid periphery; Temporal; Nasal; Superior and Inferior quadrants in both eyes should be scanned for typical areas and documented using a 50° camera field.

Special Note: - The use of the Panoret 1000 130° field of view Retinal Camera for Adults is now becoming relatively wide-spread particularly in Ophthalmic Centres with Ocular Oncology specialist divisions. The use of this camera system may be a preferred option for Retinitis Pigmentosa and other Retinal Dystrophies and would be additional to the conventional camera views. This camera does not replace the "Retcam" for ROP babies, children with NAI and children with Retinoblastoma.

JUVENILE MACULAR DEGENERATION; STARGARDT'S DISEASE

Refer to: - **SECTION C. MEDICAL RETINA AND VITREO-RETINA IMAGING STANDARDS**

SECTION F. NEURO-OPHTHALMOLOGY IMAGING STANDARDS

APPLICATION STANDARDS

RETINAL NERVE FIBRE LAYER LOSS; OPTIC ATROPHY; NEURORETINITIS

Colour

- Bilateral Optic Discs, camera centred on the Optic Disc, 30°/35° and 20° camera field of each disc
- Stereo pairs recommended
- Focus critically on the edge of the Neuro Retinal Rim.

Red Free

- Bilateral Optic Discs, camera centred at the centre of the Disc, 30°/35° camera field
- Stereo pairs recommended
- Focus on the **Nerve Fibre Layer (NFL)**
- Should match the colour images of the Optic Discs
- Care must be taken to ensure the grey tones of the nerve head are not overexposed – if in doubt provide “bracketed” exposures.

OCT

- Bilateral Scans of each Optic Disc using the '**Fast RNFL Thickness**' Acquisition Protocol.

OCULAR ISCHAEMIC SYNDROME (OIS)

Colour Retinal

- Bilateral Retinae, camera centred at the Posterior Pole, 50° camera fields
- Far and mid-periphery; Temporal; Nasal; Superior and Inferior quadrants in both eyes should be scanned for venous dilatation and retinal haemorrhages and if found, documented using a 50° camera field
- Optic Disc neovascularisation may also be found, in which case additionally use the **Optic Ischaemia Guidelines**.

Colour Anterior Segment

- If neovascularisation of the Iris is present, image using the **Iris Anterior Segment Guidelines**.

FFA

- Indicated Retina, camera centred at the Posterior Pole, 50° camera field
- Exposures must start early to include the choroidal flush and a complete arteriovenous transit
- Immediately after the AV transit is completed the retina must be visually scanned for delayed and patchy choroidal filling; areas of retinal capillary non-perfusion; late leakage from arterioles and veins; leakage from new vessels; and macular oedema
- As soon as possible the contra lateral eye should be imaged with a 50° camera field, centred at the posterior pole; and the eye should also be visually scanned for any of the signs stated previously
- At 2mins image both eyes with a 50° camera field of the Posterior Pole and any pathology seen during an earlier stage of the angiogram
- Repeat at 5mins and 10mins post injection using the same parameters.

OPTIC NEUROPATHY; GIANT CELL ARTERITIS; OPTIC ISCHAEMIA; OPTIC NEURITIS

Colour

- Bilateral Optic Discs, camera centred on the Optic Disc, 30°/35° and 20° camera field of each disc
- Stereo pairs recommended
- Focus critically on the edge of the Neuro Retinal Rim.

Red Free

- Bilateral Optic Discs, camera centred at the centre of the Disc, 30°/35° camera field
- Stereo pairs recommended
- Focus on the Optic Nerve Head
- Must match the colour images
- Care must be taken to ensure the grey tones of the nerve head are not overexposed – if in doubt provide “bracketed” exposures.

FFA

- Indicated Optic Disc, camera centred at the disc, 30°/35° camera field
- Stereo pairs recommended
- Exposures must include the complete Arterio Venous transit - subsequently at 30secs; 40secs; 50secs and 60secs
- Also provide an image of the contra lateral eye using same camera field and centring between 60 and 90 secs
- Return to the initial eye, record an image using the same parameters at 90secs
- At 2mins image both eyes - repeat at 5mins and 10mins using the same parameters.

OCT

- Bilateral Scans of each Optic Disc using the 'Fast RNFL Thickness' Acquisition Protocol.

PAPILLOEDEMA; PAPILLITIS; BENIGN INTERCRANIAL HYPERTENSION

Colour

- Bilateral Optic Discs, camera centred on the Optic Disc, 30°/35° camera field of each disc
- Stereo pairs recommended
- Focus on the anterior surface of the swollen nerve head.

Red Free

- Bilateral Optic Discs, camera centred at the centre of the Disc, 30°/35° camera field
- Stereo pairs recommended
- Focus on the Optic Nerve Head
- Must match the colour images
- Care must be taken to ensure the grey tones of the nerve head are not overexposed – if in doubt provide “bracketed” exposures.

FFA - rarely required

- Indicated optic disc, camera centred at the disc, 30°/35° camera field
- Stereo pairs recommended
- Exposures must include the complete Arterio Venous transit - subsequently at 30secs; 40secs; 50secs and 60secs
- Also provide an image of the contra lateral eye using same camera field and centring between 60 and 90 secs
- Return to the initial eye, make an image using the same parameters at 90secs
- At 2mins image both eyes using the same parameters.

OCT

- Bilateral Scans of each Optic Disc using a 'Fast RNFL Thickness' Acquisition Protocol

III, IV, VI CRANIAL NERVE PALSIES

Refer to: - SECTION A. OCULO-PLASTIC IMAGING STANDARDS for technical and positioning parameters.

NINE POSITION OF GAZE - orbits - orbital view (See Figure 2)

Orbits - Orbital (also referred to as "both eyes")

- Anterior - Camera Axis is directed to the point where the Median Plane meets the Interpupillary Line at the level of the Orbito-Helix Line
- The eyelids would be in a normal "resting" open position
- Ideally the head should be restrained to prevent compensatory head movement during the Secondary and Tertiary positions.

Primary Position

- The direction of gaze is straight ahead into the camera lens.

Secondary Positions

The patient is directed to look: -

- Straight Up as far as possible
- Straight Down as far as possible
- Straight over to the Right as far as possible
- And straight over to the Left as far as possible.

Tertiary Positions

The patient is directed to look: -

- Up and to the Right as far as possible
- Up and to the Left as far as possible
- Down and to the Right as far as possible
- And Down to the Left as far as possible.

Upper Eyelids must be retracted for the Inferior, Secondary and Tertiary Positions

Image Orientation - Horizontal

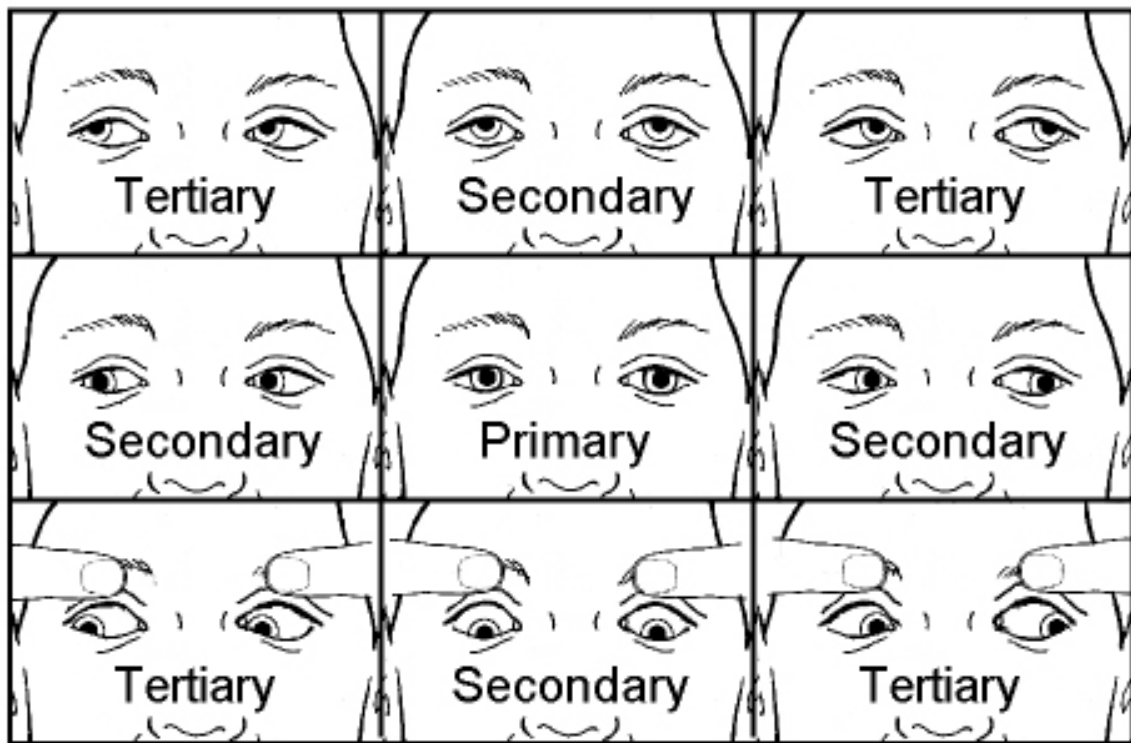


Figure 3 The images are presented as nine positions arranged in direction of gaze as a single composite comparative image.

Reproduction Ratio 1:6 - 0.5metre (60mm focal length lens) 16mm x24mm
1:4 - 0.6metre (105mm focal length lens) 24mm x 36mm

Plane of Focus - Corneal Reflex.

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