

Digital Imaging and Communications in Medicine (DICOM)

Supplement 91: Ophthalmic Photography Image SOP Classes

Prepared by:

DICOM Standards Committee

1300 N. 17th Street Suite 1847

Rosslyn, Virginia 22209 USA

VERSION: Final Text, September 23, 2004.

Table of Contents

Table of Contents	2
Foreword	4
Scope and Field of Application	4
Part 3 Additions.....	6
Part 3 Annex A Additions	8
A.41 Ophthalmic Photography 8 Bit Image Information Object Definition	9
A.41.1 Ophthalmic Photography 8 Bit Image IOD Description.....	9
A.41.2 Ophthalmic Photography 8 Bit Image IOD Entity-Relationship Model	9
A.41.3 Ophthalmic Photography 8 Bit Image IOD Modules	9
A.41.4 Ophthalmic Photography 8 Bit Image IOD Content Constraints	10
A.42 Ophthalmic Photography 16 Bit Image Information Object Definition	10
A.42.1 Ophthalmic Photography 16 Bit Image IOD Description	10
A.42.2 Ophthalmic Photography 16 Bit Image IOD Entity-Relationship Model	10
A.42.3 Ophthalmic Photography 16 Bit Image IOD Modules	10
A.42.4 Ophthalmic Photography 16 Bit Image IOD Content Constraints	11
A.43 Stereometric Relationship Information Object Definition	12
A.43.1 Stereometric Relationship IOD Entity-Relationship Model	12
A.43.2 Stereometric Relationship IOD Modules.....	12
Part 3 Annex C Additions	13
C.8.17 Ophthalmic Photography Modules	13
C.8.18 Stereometric Modules	21
Annex U Ophthalmology Use Cases (Informative).....	24
U.1 Use Cases	24
U.1.1 Routine N-spot exam	24
U.1.2 Routine N-spot exam with exceptions	24
U.1.3 Routine Fluorescein Exam	25
U.1.4 External examination	25
U.1.5 External examination with intention	25
U.1.6 External examination with drug application.....	26
U.1.7 Routine stereo camera examination.....	26
U.2 Typical Sequence of Events.....	26
Part 4 Additions.....	28
B.5 Standard SOP Classes.....	28
I.4 Media Standard Storage SOP Classes.....	28
Part 6 Additions.....	29
Part 16 Additions	31

CID 4200	Ophthalmic Imaging Agent	31
CID 4201	Patient Eye Movement Command	31
CID 4202	Ophthalmic Photography Acquisition Device	32
CID 4203	Ophthalmic Photography Illumination	32
CID 4204	Ophthalmic Filter	33
CID 4205	Ophthalmic Lens	33
CID 4206	Ophthalmic Channel Description.....	34
CID 4207	Ophthalmic Image Position.....	34
CID 4208	Mydriatic Agent.....	34
CID 4209	Ophthalmic Anatomic Structure Imaged.....	35
CID 7202	Source Image Purposes of Reference.....	36
CID 29	Acquisition Modality.....	36
Annex D	DICOM Controlled Terminology Definitions (Normative).....	38

Foreword

5 This Supplement to the DICOM Standard introduces three new IODs and SOP Classes for ophthalmic photographic imaging techniques using visible and near-visible light. The first two IODs are for ophthalmic images, while the third is used to define image relationships for stereoscopic pairs of images. The new IODs will be used with several types of ophthalmic photographic imaging devices that use light and optics to produce images of external anatomy and the cornea, and also internal retinal structures. Images created may be single frame or multi-frame, color or monochrome. Ophthalmic photographic imaging may incorporate magnification, dyes and color filters, and stereoscopic photography. Ophthalmic photographic imaging requires very specific and detailed identification of equipment used and related acquisition attributes for proper interpretation of the images.

10 This supplement does not address optical coherence tomography (OCT) or ophthalmic endoscopy. For ophthalmic endoscopy, the existing single and multiframe VL or Video Endoscopic Image Storage SOP Classes shall be used.

15

This Supplement proposes changes to the following Parts of the DICOM Standard:

- PS 3.3 - Information Object Definitions
- PS 3.4 - Service Class Specifications
- PS 3.6 - Data Dictionary
- 20 PS3.16 Content Mapping Resource

Scope and Field of Application

25 Manufacturers of ophthalmic photographic imaging devices have transitioned from film to creating digital data directly, and have identified the need for a compatible DICOM Image Object Definition for information exchange. Working Group 9 evaluated the Photographic Visible Light IOD and the new multiframe Secondary Capture IODs for adequate representation of fundus images. Some of the reasons these existing IODs are not adequate are:

- 30 a. Equipment made for ophthalmic photographic imaging includes a wide variety of light sources, lens systems, and digital camera types. The viewer of ophthalmic images sometimes needs specific equipment descriptions for proper interpretation. The General Equipment and the SC Equipment Modules specified in the VL and SC image object definitions are supplemented with an ophthalmic equipment module for adequate identification.
- 35 b. Fundus photography and fluorescein angiography devices produce combinations of single images, multiple images, and cine datasets depending on the type of equipment and procedures performed. The proposed SOP classes will provide the flexibility to exchange all of these image formats by using a multiframe module.
- 40 c. An important basic requirement for ophthalmic photographic imaging is to identify stereoscopic pairs, left and right eye image sets, and angiographic image sets. Stereoscopic pairs of images are kept together through the use of a new stereoscopic relationship entity.
- 45 d. An important basic requirement for ophthalmic contrast agent based procedures (such as Fluorescein and ICG angiography) is to identify time stamping for angiographic image sets. Synchronization and time attributes are included in these modules to provide the necessary temporal relationships.

- e. Because the proposed IODs encompass several photographic imaging techniques, an extended acquisition specification and corresponding code values will be required for complete descriptions.

50

The expected use cases are described below in an informative annex that will become part of the standard.

Part 3 Additions

55

Modify PS3.3 Table A.1-1 to add new IOD: Ophthalmic Photography Imaging

IODs Modules	...	<u>8-bit Ophth</u>	<u>16-bit Ophth</u>	...
Patient		<u>M</u>	<u>M</u>	
Specimen Identification		<u>U</u>	<u>U</u>	
Clinical Trial Subject		<u>U</u>	<u>U</u>	
General Study		<u>M</u>	<u>M</u>	
Patient Study		<u>U</u>	<u>U</u>	
Clinical Trial Study		<u>U</u>	<u>U</u>	
General Series		<u>M</u>	<u>M</u>	
Ophthalmic Series		<u>M</u>	<u>M</u>	
Clinical Trial Series		<u>U</u>	<u>U</u>	
...				
Synchronization		<u>M</u>	<u>M</u>	
...				
General Equipment		<u>M</u>	<u>M</u>	
SC Equipment				
General Image Image Plane		<u>M</u>	<u>M</u>	
Image Pixel		<u>M</u>	<u>M</u>	
Enhanced Contrast/Bolus		<u>C</u>	<u>C</u>	
...				
Cine		<u>C</u>	<u>C</u>	
Multi-frame		<u>M</u>	<u>M</u>	
...				
Ophthalmic Photography Image		<u>M</u>	<u>M</u>	
Ocular Region		<u>M</u>	<u>M</u>	

Imaged				
Ophthalmic Photography Acquisition Parameters		<u>M</u>	<u>M</u>	
Ophthalmic Photographic Parameters		<u>M</u>	<u>M</u>	
SOP Common		<u>M</u>	<u>M</u>	

60

Modify PS3.3 Table A.1-2 to add a new module: Stereometric Relationship

**Table A.1-2
 COMPOSITE INFORMATION OBJECT MODULES OVERVIEW - NON-IMAGES**

IODs Modules	...	<u>Stereo metric Reltn</u>	...
Patient		<u>M</u>	
Patient Summary			
Specimen Identification		<u>C</u>	
Clinical Trial Subject		<u>U</u>	
General Study		<u>M</u>	
Patient Study		<u>U</u>	
Clinical Trial Study		<u>U</u>	
Study Content			
General Series			
Clinical Trial Series		<u>U</u>	
Stereometric Series		<u>M</u>	
...			
Presentation Series			
SR Document Series			
Key Object Document Series			
Frame Of Reference			

Synchronization		<u>M</u>	
Cardiac Synchronization			
Respiratory Synchronization			
Bulk Motion Synchronization			
General Equipment		<u>M</u>	
General Image			
Image Plane			
Image Pixel			
Multi-frame			
Stereometric Relationship		<u>M</u>	
SR Document General			
SR Document Content			
Key Object Document			
...			
...			
Softcopy VOI LUT			
Softcopy Presentation LUT			
Image Histogram			
Presentation State			
LUT Identification			
Acquisition Context			
Common Instance Reference		<u>M</u>	
SOP Common		<u>M</u>	

65

Part 3 Annex A Additions

70

Modify PS3.3 Annex A

A.41 Ophthalmic Photography 8 Bit Image Information Object Definition

75 This Section defines an Information Object to be used with several types of ophthalmic photographic imaging devices including fundus cameras, slit lamp cameras, scanning laser devices, stereoscopic cameras, video equipment and digital photographic equipment, with 8 bit resolution per pixel in each image plane.

A.41.1 Ophthalmic Photography 8 Bit Image IOD Description

80 The Ophthalmic Photography 8 Bit Image IOD specifies a single-frame or a multi-frame image acquired on a digital photographic DICOM modality. This IOD can be used to encode single ophthalmic images and cine sequences.

A.41.2 Ophthalmic Photography 8 Bit Image IOD Entity-Relationship Model

85 The E-R Model in Section A.1.2 of this Part depicts those components of the DICOM Information Model that directly reference the Ophthalmic Photography 8-Bit Image IOD, with exception of the Curve, VOI LUT, and Modality LUT entities, which are not used. Table A.41-1 specifies the Modules of the Ophthalmic Photography 8 Bit Image IOD.

A.41.3 Ophthalmic Photography 8 Bit Image IOD Modules

90 **Table A.41-1**
OPHTHALMIC PHOTOGRAPHY 8 BIT IMAGE IOD MODULES

IE	Module	Reference	Usage
Patient	Patient	C.7.1.1	M
	Specimen Identification	C.7.1.2	C - Required if the Imaging Subject is a Specimen
	Clinical Trial Subject	C.7.1.3	U
Study	General Study	C.7.2.1	M
	Patient Study	C.7.2.2	U
	Clinical Trial Study	C.7.2.3	U
Series	General Series	C.7.3.1	M
	Ophthalmic Photography Series	C.8.17.1	M
	Clinical Trial Series	C.7.3.2	U
Frame of Reference	Synchronization	C.7.4.2	M
Equipment	General Equipment	C.7.5.1	M
Image	General Image	C.7.6.1	M
	Image Pixel	C.7.6.3	M
	Enhanced Contrast/Bolus	C 7.6.4.b	C – Required if contrast was administered, see A.41.4.2
	Cine	C.7.6.5	C - Required if there is a sequential temporal relationship between all frames
	Multi-frame	C.7.6.6	M
	Ophthalmic	C.8.17.2	M

Photography Image		
Ocular Region Imaged	C.8.17.5	M
Ophthalmic Photography Acquisition Parameters	C.8.17.4	M
Ophthalmic Photographic Parameters	C.8.17.3	M
SOP Common	C.12.1	M

A.41.4 Ophthalmic Photography 8 Bit Image IOD Content Constraints

The following constraints on Series and Image attributes take precedence over the descriptions given in the Module Attribute Tables.

95 **A.41.4.1 Bits Allocated, Bits Stored, and High Bit**

For Ophthalmic Photography 8 bit images, the Enumerated Value of Bits Allocated (0028,0100) (Image Pixel Module, C.7.6.3) shall be 8; the Enumerated Value of Bits Stored (0028,0101) shall be 8; and the Enumerated Value of High Bit (0028,0102) shall be 7.

A.41.4.2 Contrast/Bolus Agent Sequence

100 For Contrast/Bolus Agent Sequence (0018,0012), the defined CID 4200 shall be used.

A.42 Ophthalmic Photography 16 Bit Image Information Object Definition

105 This Section defines an Information Object to be used with several types of ophthalmic photographic imaging devices including fundus cameras, slit lamp cameras, scanning laser devices, stereoscopic cameras, video equipment and digital photographic equipment, with 16 bit resolution per pixel in each image plane.

A.42.1 Ophthalmic Photography 16 Bit Image IOD Description

The Ophthalmic Photography 16 Bit Image IOD specifies a single-frame or a multi-frame image acquired on a digital photographic DICOM modality. This IOD can be used to encode single ophthalmic images and other combinations including cine sequences.

110 **A.42.2 Ophthalmic Photography 16 Bit Image IOD Entity-Relationship Model**

115 The E-R Model in Section A.1.2 of this Part depicts those components of the DICOM Information Model that directly reference the Ophthalmic Photography 16-Bit Image IOD, with exception of the Curve, VOI LUT, Frame of Reference and Modality LUT entities, which are not used. Table A.42-1 specifies the Modules of the Ophthalmic Photography 16 Bit Image IOD.

A.42.3 Ophthalmic Photography 16 Bit Image IOD Modules

**Table A.42-1
OPHTHALMIC PHOTOGRAPHY 16 BIT IMAGE IOD MODULES**

IE	Module	Reference	Usage
Patient	Patient	C.7.1.1	M
	Specimen Identification	C.7.1.2	C - Required if the Imaging Subject is a Specimen

	Clinical Trial Subject	C.7.1.3	U
Study	General Study	C.7.2.1	M
	Patient Study	C.7.2.2	U
	Clinical Trial Study	C.7.2.3	U
Series	General Series	C.7.3.1	M
	Ophthalmic Photography Series	C.8.17.1	M
	Clinical Trial Series	C.7.3.2	U
Frame of Reference	Synchronization	C.7.4.2	M
Equipment	General Equipment	C.7.5.1	M
Image	General Image	C.7.6.1	M
	Image Pixel	C.7.6.3	M
	Enhanced Contrast/Bolus	C.7.6.4.b	C – Required if contrast was administered; see A.42.4.2
	Cine	C.7.6.5	C - Required if there is a sequential temporal relationship between all frames
	Multi-frame	C.7.6.6	M
	Ophthalmic Photography Image	C.8.17.2	M
	Ocular Region Imaged	C.8.17.5	M
	Ophthalmic Photography Acquisition Parameters	C.8.17.4	M
	Ophthalmic Photographic Parameters	C.8.17.3	M
	SOP Common	C.12.1	M

120 **A.42.4 Ophthalmic Photography 16 Bit Image IOD Content Constraints**

The following constraints on Series and Image attributes take precedence over the descriptions given in the Module Attribute Tables.

A.42.4.1 Bits Allocated, Bits Stored, and High Bit

125 For Ophthalmic Photography 16 bit images, the Enumerated Value of Bits Allocated (0028,0100) (Image Pixel Module, C.7.6.3) shall be 16; the Enumerated Value of Bits Stored (0028,0101) shall be 16; and the Enumerated Value of High Bit (0028,0102) shall be 15.

A.42.4.2 Contrast/Bolus Agent Sequence

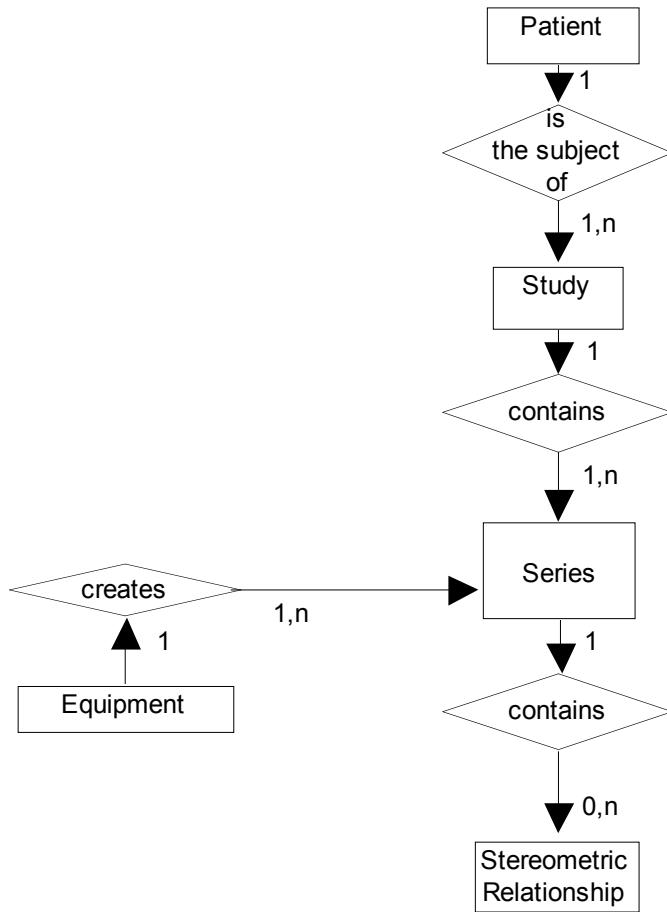
For Contrast/Bolus Agent Sequence (0018,0012), the defined CID 4200 shall be used.

130 *Modify PS3.3 Annex A*

A.43 Stereometric Relationship Information Object Definition

135 This Section defines an Information Object to be used for linking together images belonging to stereoscopic pairs. A Series IE will typically contain a single Stereometric Relationship IE that references one or more sets of stereoscopic images. Stereoscopic pairs for ophthalmic photographic imaging may include single images, multi-frame images, or cine images.

A.43.1 Stereometric Relationship IOD Entity-Relationship Model



140

Figure A.43-1 STEREOMETRIC RELATIONSHIP INFORMATION OBJECT DEFINITION E-R MODEL

A.43.2 Stereometric Relationship IOD Modules

**Table A.43-2
STEREOMETRIC RELATIONSHIP IOD MODULES**

145

IE	Module	Reference	Usage
Patient	Patient	C.7.1.1	M
	Specimen Identification	C.7.1.2	C - Required if the Imaging Subject is a Specimen

	Clinical Trial Subject	C.7.1.3	U
Study	General Study	C.7.2.1	M
	Patient Study	C.7.2.2	U
	Clinical Trial Study	C.7.2.3	U
Series	Clinical Trial Series	C.7.3.2	U
	Stereometric Series	C.8.18.1	M
Equipment	General Equipment	C.7.5.1	M
Stereometric Relationship	Stereometric Relationship Module	C.8.18.2	M
	Common Instance Reference Module	C.12.2	M
	SOP Common	C.12.1	M

Part 3 Annex C Additions

150 Modify PS3.3 Annex C – Add to the list of Modality (0008,0060) Defined Terms (C.7.3.1.1.1)

OP = Ophthalmic Photography
SMR = Stereometric Relationship

155 Modify PS3.3 Annex C

C.8.17 Ophthalmic Photography Modules

C.8.17.1 Ophthalmic Photography Series Module

Table C.8.17.1-1 specifies the attributes that describe an Ophthalmic Photography Series.

160

**Table C.8.17.1-1
OPHTHALMIC PHOTOGRAPHY SERIES MODULE ATTRIBUTES**

Attribute Name	Tag	Type	Attribute Description
Modality	(0008,0060)	1	Source equipment that produced the Ophthalmic Photography Series. Enumerated Value: OP

C.8.17.2 Ophthalmic Photography Image Module

Table C.8.17.2-1 specifies the Attributes that describe an Ophthalmic Photography Image produced by Ophthalmic Photography equipment (OP) imaging Modalities.

165

**Table C.8.17.2-1
OPHTHALMIC PHOTOGRAPHY IMAGE MODULE ATTRIBUTES**

Attribute Name	Tag	Type	Attribute Description
Image Type	(0008,0008)	1	Image identification characteristics. See C.8.17.2.1.4 for specialization.
Instance Number	(0020,0013)	1	A number that identifies this image.
Samples per Pixel	(0028,0002)	1	Number of samples (planes) in this image. Enumerated values: 1 or 3. See C.8.17.2.1.2 for further explanation.
Samples per Pixel Used	(0028,0003)	1C	The number of samples (planes) containing information. Enumerated value: 2. Required if different from Samples per Pixel (0028,0002). Shall not be present otherwise. See section C.8.17.2.1.2
Photometric Interpretation	(0028,0004)	1	Specifies the intended interpretation of the pixel data. See section C.8.17.2.1.3
Pixel Representation	(0028,0103)	1	Data representation of the pixel samples. Enumerated value: 0
Planar Configuration	(0028,0006)	1C	Indicates whether the pixel data are sent color-by-plane or color-by-pixel. Required if Samples per Pixel (0028,0002) has a value greater than 1. Enumerated value shall be 0 (color-by-pixel).
Pixel Spacing	(0028,0030)	1C	Nominal physical distance at the focal plane (in the retina) between the center of each pixel, specified by a numeric pair - adjacent row spacing (delimiter) adjacent column spacing in mm. Note: These values are specified as nominal because the physical distance may vary across the field of the images and the lens correction is likely to be imperfect. Required when Acquisition Device Type Code Sequence (0022,0015) contains an item with the value (SRT, R-1021A, "Fundus Camera"). May be present otherwise.
Content Time	(0008,0033)	1	The time the image pixel data creation started.
Content Date	(0008,0023)	1	The date the image pixel data creation started.
Acquisition Datetime	(0008,002A)	1C	The date and time that the acquisition of data started. Note: The synchronization of this time with an external clock is specified in the synchronization Module in Acquisition Time Synchronized (0018,1800). Required if Image Type (0008,0008) Value 1 is ORIGINAL. May be present otherwise.
Source Image Sequence	(0008,2112)	2C	A Sequence that identifies the set of Image SOP Class/Instance pairs of the Images that were used to derive this Image. Required if Image Type Value 1 is DERIVED. Zero or more items may be present in the sequence. See C.7.6.1.1.4 for further explanation.
<i>>Include Image SOP Instance Reference Macro, Table 10-3</i>			
>Purpose of Reference Code	(0040,A170)	1C	Describes the purpose for which the reference is made, that is what role the source image or frame(s) played in the

Sequence			derivation of this image.
>>Include 'Code Sequence Macro' Table 8.8-1			<i>Defined Context ID is 7202.</i>
Lossy Image Compression	(0028,2110)	1	Specifies whether an Image has undergone lossy compression. Enumerated Values: 00 = Image has NOT been subjected to lossy compression. 01 = Image has been subjected to lossy compression. See C.7.6.1.1.5
Lossy Image Compression Ratio	(0028,2112)	1C	Describes the approximate lossy compression ratio(s) that have been applied to this image. See C.7.6.1.1.5 for further explanation. May be multivalued if successive lossy compression steps have been applied. Notes: 1. For example, a compression ratio of 30:1 would be described in this Attribute with a single value of 30. 2. For historical reasons, the lossy compression ratio should also be described in Derivation Description (0008,2111) Required if Lossy Image Compression (0028,2110) has a value of "01".
Lossy Image Compression Method	(0028,2114)	1C	A label for the lossy compression method(s) that have been applied to this image. See C.7.6.1.1.5 for further explanation. May be multivalued if successive lossy compression steps have been applied; the value order shall correspond to the values of Lossy Image Compression Ratio (0028,2112). Required if Lossy Image Compression (0028,2110) has a value of "01". Note: For historical reasons, the lossy compression method should also be described in Derivation Description (0008,2111).
Presentation LUT Shape	(2050,0020)	1C	Specifies an identity transformation for the Presentation LUT, such that the output of all grayscale transformations defined in the IOD containing this Module are defined to be P-Values. Enumerated Values: IDENTITY - output is in P-Values. Required if Photometric Interpretation (0028,0004) is MONOCHROME2
Calibration Image	(0050,0004)	3	Indicates whether a reference object (phantom) of known size is present in the image and was used for calibration. Enumerated Values: YES NO
Burned In Annotation	(0028,0301)	1	Indicates whether or not image contains sufficient burned in annotation to identify the patient and date the image was acquired. Enumerated Value:

			YES NO
--	--	--	-----------

C.8.17.2.1 Ophthalmic Photography Image Module Attribute Descriptions

170 **C.8.17.2.1.1 Referenced Image Sequence**

The Referenced Image Sequence (0008,1140) in the General Image Module (Section C.7.6.1) shall not convey stereoscopic information, which instead shall be encoded using the Stereometric Relationship IOD.

C.8.17.2.1.2 Samples per Pixel and Samples per Pixel Used

175 Samples per Pixel (0028,0002) shall be 1 or 3.

Cameras producing 2-color images are required to use a value of 3 for Samples per Pixel (0028,0002) and a value of 2 for Samples per Pixel Used (0028,0003). For 2-color images with a RGB Photometric Interpretation, the R and G channel shall be used and the B channel shall have all values set to zero.

180 Note: In the case of Photometric Interpretations typically used for compression such as YBR_FULL_422, the encoding will be as if the RGB values were transformed to YCbCr.

C.8.17.2.1.3 Photometric Interpretation

Specifies the intended interpretation of the pixel data. Enumerated Values shall be:

- 185 MONOCHROME2
RGB
YBR_FULL_422
YBR_PARTIAL_420
YBR_ICT
190 YBR_RCT

C.8.17.2.1.4 Image Type

195 The Image Type attribute (0008,0008) (General Image Module, C.7.6.1) identifies important image characteristics in a multiple valued data element. For the Ophthalmic Photography Image IOD, Image Type is specified as a Type 1 attribute and further specialized as follows:

- a. Value 1 shall identify the Pixel Data Characteristics in accordance with Section C.7.6.1.1.2; Enumerated Values are: ORIGINAL and DERIVED;
- b. Value 2 shall identify the Patient Examination Characteristics in accordance with Section C.7.6.1.1.2; Enumerated Value is: PRIMARY
- 200 c. Value 3 shall only be present if Value 1 is DERIVED; Defined Terms: MONTAGE.
- d. Value 4 (optionally present) shall identify the type of test performed for image acquisition. Defined terms:

- COLOR - a picture take at “white” light; no filters applied
- 205 REDFREE - a picture take at “green” illumination light; or just the green channel of a color sensor
- RED - a picture take at “red” illumination light; or just the red channel of a color sensor
- BLUE - a picture take at “blue” illumination light; or just the blue channel of a color sensor

- 210 FA- fluorescein injected; a picture taken at fluorescein exciting illumination light; a filter passing just the emitted wavelength to sensor applied
ICG - Indocyanine green injected; a picture taken at Indocyanine green exciting illumination light; a filter passing just the emitted wavelength to sensor applied
- 215 Note: A Montage Image is constructed out of several individual images, which also can be exchanged separately. The images used to create the montage image will be included in the source image sequence if those images are also exchanged. A Montage Image is identified as Image Type DERIVED\PRIMARYMONTAGE
- 220 **C.8.17.3 Ophthalmic Photographic Parameters Module**
This Module describes equipment used to create original images.

**Table C.8.17.3-1
OPHTHALMIC PHOTOGRAPHIC PARAMETERS MODULE ATTRIBUTES**

Attribute Name	Tag	Type	Attribute Description
Acquisition Device Type Code Sequence	(0022,0015)	1	Describes the type of acquisition device. A single item shall be present in the sequence.
<i>>Include 'Code Sequence Macro' Table 8.8.1</i>			Baseline Context ID is 4202
Illumination Type Code Sequence	(0022,0016)	2	Coded value for illumination. Zero or one item shall be present in the sequence.
<i>>Include 'Code Sequence Macro' Table 8.8.1</i>			Baseline Context ID is 4203
Light Path Filter Type Stack Code Sequence	(0022,0017)	2	Filters used in the light source path. Zero or more items may be present in the sequence.
<i>>Include 'Code Sequence Macro' Table 8.8.1</i>			Baseline Context ID is 4204
Light Path Filter Pass-Through Wavelength	(0022,0001)	3	Nominal pass-through wavelength of light path filter in nm
Light Path Filter Pass Band	(0022,0002)	3	Pass band of light path filter in nm. This Attribute has two Values. The first is the shorter and the second the longer wavelength relative to the peak. The values are for the – 3dB nominal (1/2 of peak) pass through intensity. One of the two Values may be zero length, in which case it is a cutoff filter.
Image Path Filter Type Stack Code Sequence	(0022,0018)	2	Describes stack of filters used in image path. Zero or more items may be present in the sequence.
<i>>Include 'Code Sequence Macro' Table 8.8.1</i>			Baseline Context ID is 4204
Image Path Filter Pass-Through Wavelength	(0022,0003)	3	Nominal pass-through wavelength of image path filter in nm
Image Path Filter Pass Band	(0022,0004)	3	Pass band of image path filter in nm. This Attribute has two Values. The first is the shorter and the second the longer wavelength relative to the peak. The values are for the – 3dB nominal (1/2 of peak) pass through intensity. One of the two Values may be zero length, in which case it is a cutoff filter
Lenses Code Sequence	(0022,0019)	2	Lenses that were used during the image acquisition. Zero or more items may be present in the sequence.
<i>>Include 'Code Sequence Macro' Table 8.8.1</i>			Baseline Context ID is 4205
Detector Type	(0018,7004)	2	Type of detector used for creating this image. Defined terms: CCD = Charge Coupled Devices CMOS = Complementary Metal Oxide Semiconductor

Channel Description Code Sequence	(0022,001A)	1C	<p>Describes the light color used for each channel to generate the image. Required if this differs from the natural interpretation.</p> <p>Note: Interpretation and representation of RGB images rely on the assumption that the red channel really contains the red wavelength range of illumination light, the blue channel the blue wavelength range, etc. Some modalities use the RGB Photometric Interpretation as a container representing 3 channels of any illumination wavelength.</p> <p>Shall have the same number of items as the Value of Samples per Pixel Used (0028,0003) if present, or otherwise the value of Samples per Pixel (0028,0002). The channels shall be described in the order in which the channels are encoded.</p>
>Include 'Code Sequence Macro' Table 8.8.1		Baseline Context ID is 4206	

225

C.8.17.4 Ophthalmic Photography Acquisition Parameters Module

This Module describes patient clinical conditions related to the image acquisition.

Table C.8.17.4-1
OPHTHALMIC PHOTOGRAPHY ACQUISITION PARAMETERS MODULE ATTRIBUTES

Attribute Name	Tag	Type	Attribute Description
Patient Eye Movement Commanded	(0022,0005)	2	Enumerated Values: YES NO
Patient Eye Movement Command Code Sequence	(0022,0006)	1C	Coded value for patient movement or orientation, which is the intent, and not necessarily the result, based on what the patient is capable of. Required if the value of Patient Eye Movement Commanded (0022,0005) is YES. A single item shall be present in this sequence.
<i>>Include 'Code Sequence Macro' Table 8.8.1</i>			Baseline Context ID is 4201
Refractive State Sequence	(0022,001B)	2	The refractive state of the imaged eye at the time of acquisition. Zero or one Item shall be present. Absence of an item means the refractive state was not measured.
> Spherical Lens Power	(0022,0007)	1	Sphere value in diopters
> Cylinder Lens Power	(0022,0008)	1	Cylinder value in diopters
> Cylinder Axis	(0022,0009)	1	Axis value in degrees
Emmetropic Magnification	(0022,000A)	2	Emmetropic Magnification value (dimensionless). Zero length means the emmetropic magnification was not measured.
Intra Ocular Pressure	(0022,000B)	2	Value of pressure. Value in mmHg. Zero length means the pressure was not measured.
Horizontal Field of View	(0022,000C)	2	The horizontal field of view in degrees
Pupil Dilated	(0022,000D)	2	Enumerated Values: YES NO
Mydriatic Agent Code Sequence	(0022,001C)	2C	The agent administered to dilate the pupil. Required if the value of Pupil Dilated (0022,000D) is YES. Zero or more items may be present.
<i>>Include 'Code Sequence Macro' Table 8.8.1</i>			Baseline Context ID is 4208
Degree of Dilation	(0022,000E)	2C	The degree of the dilation in mm Required if the value of Pupil Dilated (0022,000D) is YES.

C.8.17.5 Ocular Region Imaged Module

Table C.8.17.5-1 contains IOD Attributes that describe the anatomy contained in an OP IOD.

**Table C.8.17.5-1
OCULAR REGION IMAGED MODULE ATTRIBUTES**

Attribute Name	Tag	Type	Attribute Description
Image Laterality	(0020,0062)	1	<p>Laterality of object imaged (as described in Anatomic Region Sequence (0008,2218)) examined.</p> <p>Enumerated Values: R = right eye L = left eye B = both left and right eye</p> <p>Shall be consistent with any laterality information contained in Primary Anatomic Structure Modifier Sequence (0008,2230), if present.</p> <p>Note: Laterality (0020,0060) is a Series level Attribute and must be the same for all Images in the Series. Since most Ophthalmic Photographic Image studies contain images of both eyes, the series level attribute will rarely be present.</p>
Relative Image Position Code Sequence	(0022,001D)	3	The position of this image on the retina (as defined by a specified nomenclature; the nomenclature is implicit in the code used).
>Include 'Code Sequence Macro' Table 8.8.1			Baseline Context ID 4207
Include 'General Anatomy Mandatory Macro' Table 10-5			Defined Context ID 4209 for Anatomic Region Sequence

235

Modify PS3.3 Annex C

C.8.18 Stereometric Modules

240 **C.8.18.1 Stereometric Series Module**

Table C.8.18.1-1 specifies the Attributes that describe a Stereometric Series produced by Ophthalmic Photography equipment (OP) imaging Modalities.

**Table C.8.18.1-1
STEREOMETRIC SERIES MODULE ATTRIBUTES**

Attribute Name	Tag	Type	Attribute Description
Modality	(0008,0060)	1	Source equipment that produced the Stereometric Series. Enumerated Value: SMR

245

C.8.18.2 Stereometric Relationship Module

250 The stereometric relationship module is used to identify pairs of images that may be viewed in stereo. It is possible that the same image or frame may be a member of multiple pairs. The images forming a pair shall be in different SOP Instances. The images forming a pair can be in different Series. All Instances referenced in this Module shall be in the same Study as the Instance in which the Module occurs.

255

**Table C.8.18.2 -1
STEREOMETRIC RELATIONSHIP MODULE ATTRIBUTES**

Attribute Name	Tag	Type	Attribute Description
Stereo Pairs Sequence	(0022,0020)	1	Sequence of items identifying pairs of images. There shall be one or more items in this sequence.
>Stereo Baseline Angle	(0022,0010)	3	Stereo separation angle in degrees
>Stereo Baseline Displacement	(0022,0011)	3	Horizontal displacement of instrument between left and right image in mm
>Stereo Horizontal Pixel Offset	(0022,0012)	3	Horizontal displacement of right image relative to left image in pixels for optimal display. Offset of right image to right means positive value.
>Stereo Vertical Pixel Offset	(0022,0013)	3	Vertical displacement of right image relative to left image in pixels for optimal display. Offset of right image downwards means positive value.
>Stereo Rotation	(0022,0014)	3	Rotation of right image relative to left image in degrees for optimal display. The rotation of the right image against the left image counterclockwise is positive, rotation around the center is assumed.
>Left Image Sequence	(0022,0021)	1	Left Image of the Pair. Only one Item shall be present in this Sequence.
>>Include Image SOP Instance Reference Macro, Table 10-3			The Referenced SOP Instance UID (0008,1155) shall not be the same as the Referenced SOP Instance UID (0008,1155) of the Right Image Sequence (0022,0022).
>Right Image Sequence	(0022,0022)	1	Right Image of the Pair. Only one Item shall be present in this Sequence.
>>Include Image SOP Instance Reference Macro, Table 10-3			The Referenced SOP Instance UID (0008,1155) shall not be the same as the Referenced SOP Instance UID (0008,1155) of the Left Image Sequence (0022,0021).

C.8.18.2.1 Stereometric Relationship Module Attribute Descriptions

C.8.18.2.1.1 Left and Right Image Sequences

260 The images referenced by the Left Image Sequence (0022,0021) and Right Image Sequence (0022,0022) in a single Stereo Pairs Sequence Item shall have the same values for Rows (0028,0010) and the same values for Columns (0028,0011).

The reference may be to images with a single frame, all the frames of images with multiple frames, or one or more selected frames within an image with multiple frames. If multiple frames are selected, the same number of frames shall be referenced from both sequences.

265

265

Add to PS3.17 Annex U

Annex U Ophthalmology Use Cases (Informative)

270 U.1 Use Cases

The following use cases are examples of how the DICOM Ophthalmology Photography objects may be used. These use cases utilize the term “picture” or “pictures” to avoid using the DICOM terminology of frame, instance or image. In the use cases, the series means DICOM Series.

U.1.1 Routine N-spot exam

275 An N-spot retinal photography exam means that “N” predefined locations on the retina are examined.

A routine N-spot retinal photography exam is ordered for both eyes. There is nothing unusual observed during the exam, so N pictures are taken of each retina. This healthcare facility also specifies that in an N-spot exam a routine external picture is captured of both eyes, that the current intraocular pressure (IOP) is measured, and that the current refractive state is measured.

280

The resulting study contains:

2N pictures of the retina and one external picture. Each retinal picture is labeled in the acquisition information to indicate its position in the local N-spot definition. The series is not labeled, each picture is labeled OS or OD as appropriate.

285

Note: DICOM uses L, R, and B in the Image Laterality Attribute (0020,0062). The actual encodings will be L, R, or B. Ophthalmic equipment can convert this to OS, OD, and OU before display.

In the acquisition information of every picture, the IOP and refractive state information is replicated.

290

Since there are no stereo pictures taken, there is no Stereometric Relationship IOD instance created.

The pictures may or may not be in the same Series.

U.1.2 Routine N-spot exam with exceptions

295 A routine N-spot retinal photography exam is ordered for both eyes. During the exam a lesion is observed in the right eye. The lesion spans several spots, so an additional wide angle view is taken that captures the complete lesion. Additional narrow angle views of the lesion are captured in stereo. After completing the N-spot exam, several slit lamp pictures are taken to further detail the lesion outline.

The resulting study contains:

300

a. 2N pictures of the retina and one external picture, one additional wide angle picture of the abnormal retina, 2M additional pictures for the stereo detail of the abnormal retina, and several slit lamp pictures of the abnormal eye. The different lenses and lighting parameters are documented in the acquisition information for each picture.

305

b. One instance of a Stereometric Relationship IOD, indicating which of the stereo detail pictures above should be used as stereo pairs.

The pictures may or may not be in the same Series.

U.1.3 Routine Fluorescein Exam

A routine fluorescein exam is ordered for one eye. The procedure includes:

- 310 a. Routine stereo N-spot pictures of both eyes, routine external picture, and current IOP.
- b. Reference stereo picture of each eye using filtered lighting
- c. Fluorescein injection
- d. Capture of 20 stereo pairs with about 0.7 seconds between pictures in a pair and 3-5 seconds between pairs.
- 315 e. Stereo pair capture of each eye at increasing intervals for the next 10 minutes, taking a total of 8 pairs for each eye.

The result is a study with:

- 320 a. The usual 2N+1 pictures from the N-spot exam
- b. Four pictures taken with filtered lighting (documented in acquisition information) that constitute a stereo pair for each eye.
- c. 40 pictures (20 pairs) for one eye of near term fluorescein. These include the acquisition information, lighting context, and time stamp.
- d. 32 pictures (8 pairs for each eye) of long term fluorescein. These include acquisition information, lighting context, and time stamp.
- 325 e. One Stereometric Relationship IOD, indicating which of the above OP instances should be used as stereo pairs.

The pictures of a) through d) may or may not be in the same series.

U.1.4 External examination

330 The patient presents with a generic eye complaint. Visual examination reveals a possible abrasion. The general appearance of the eyes is documented with a wide angle shot, followed by several detailed pictures of the ocular surface. A topical stain is applied to reveal details of the surface lesion, followed by several additional pictures. Due to the nature of the examination, no basic ophthalmic measurements were taken.

The result is a study with one or more series that contains:

- 335 a. One overall external picture of both eyes
- b. Several close-up pictures of the injured eye
- c. Several close-up pictures of the injured eye after topical stain. These pictures have the additional stain information conveyed in the acquisition information for these pictures.

340 U.1.5 External examination with intention

The patient is suspected of a nervous system injury. A series of external pictures are taken with the patient given instructions to follow a light with his eyes. For each picture the location of the light is indicated by the patient intent information, (e.g. above, below, patient left, patient right).

The result is a study with one or more series that contains:

- 345 a. Individual pictures with each picture using the patient intent field to indicate the intended direction.

U.1.6 External examination with drug application

350 Patient is suspected of myasthenia gravis. Both eyes are imaged in normal situation. Then after Tensilon® (edrophonium chloride) injection a series of pictures is taken. The time, amount, and method of Tensilon® (edrophonium chloride) administration is captured in the acquisition information. The time stamps of the pictures are used in conjunction with the behavior of the eyelids to assess the state of the disease.

Note: Tensilon® is a registered trademark of Roche Laboratories

355

The result is a study with one or more series that contains:

- a. Multiple reference pictures prior to test
- b. Pictures with acquisition information to document drug administration time.

360 U.1.7 Routine stereo camera examination

A stereo optic disk examination is ordered for a patient with glaucoma. For this examination, the IOP does not need to be measured. The procedure includes:

- a. Mydriasis using agent at time t
- 365 b. N stereo pictures (camera pictures right and left stereo picture simultaneously) of the optic disk region at the time $t+s$

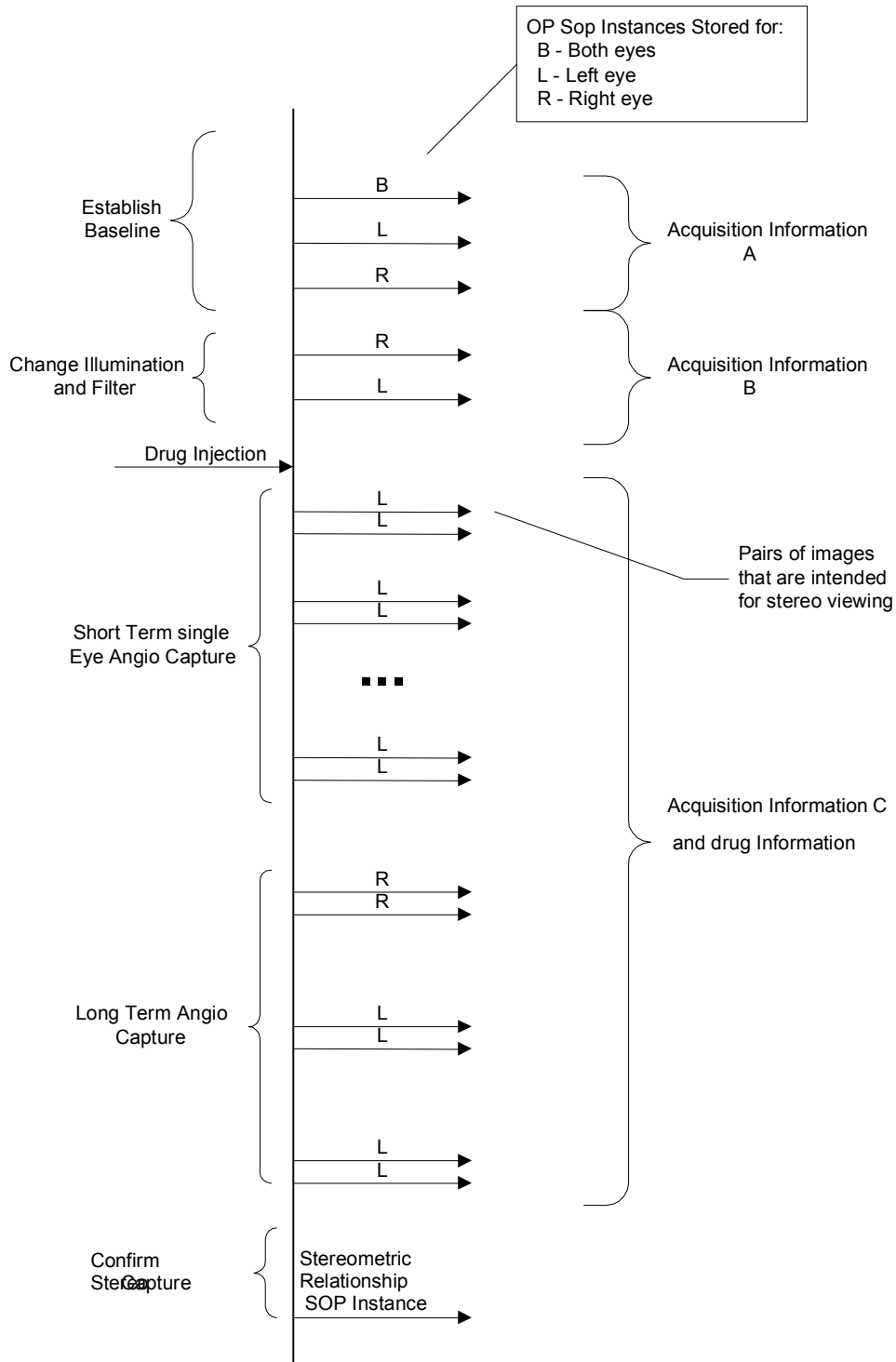
The result is a study with:

- a. N right and N left stereo pictures. These include acquisition information, lighting context, agent and time stamps.
- 370 b. One Stereometric Relationship IOD, indicating that the above OP instances should be used as stereo pairs.

U.2 Typical Sequence of Events

The following shows the proposed sequence of events using individual images that are captured for later stereo viewing, with the stereo viewing relationships captured in the stereometric relationship instance.

375



The instances captured are all time stamped so that the fluorescein progress can be measured accurately. The acquisition and equipment information captures the different setups that are in use:

380

- a. **Acquisition information A** is the ordinary illumination and planned lenses for the examination.

- 385
- b. **Acquisition information B** is the filtered illumination, filtered viewing, and lenses appropriate for the fluorescein examination.
 - c. **Acquisition information C** indicates no change to the equipment settings, but once the injection is made, the subsequent images include the drug, method, dose, and time of delivery.

Part 4 Additions

390

Add to PS3.4 Annex B.5.

B.5 Standard SOP Classes

Table B.5-1
STANDARD SOP CLASSES

SOP Class Name	SOP Class UID	IOD (See PS 3.3)
...		
<u>Ophthalmic Photography 8 Bit Image Storage</u>	<u>1.2.840.10008.5.1.4.1.1.77.1.5.1</u>	<u>Ophthalmic Photography 8 Bit Image</u>
<u>Ophthalmic Photography 16 Bit Image Storage</u>	<u>1.2.840.10008.5.1.4.1.1.77.1.5.2</u>	<u>Ophthalmic Photography 16 Bit Image</u>
<u>Stereometric Relationship Storage</u>	<u>1.2.840.10008.5.1.4.1.1.77.1.5.3</u>	<u>Stereometric Relationship</u>

395

Add to PS3.4 Annex I.4.

I.4 Media Standard Storage SOP Classes

Table I.4-1
Media Storage Standard SOP Classes

SOP Class Name	SOP Class UID	IOD (See PS 3.3)
...		
<u>Ophthalmic Photography 8 Bit Image Storage</u>	<u>1.2.840.10008.5.1.4.1.1.77.1.5.1</u>	<u>Ophthalmic Photography 8 Bit Image</u>
<u>Ophthalmic Photography 16 Bit Image Storage</u>	<u>1.2.840.10008.5.1.4.1.1.77.1.5.2</u>	<u>Ophthalmic Photography 16 Bit Image</u>
<u>Stereometric Relationship Storage</u>	<u>1.2.840.10008.5.1.4.1.1.77.1.5.3</u>	<u>Stereometric Relationship</u>

400

Part 6 Additions

405

Add to PS3.6 Annex A

UID Value	UID NAME	UID TYPE	Part
...			
<u>1.2.840.10008.5.1.4.1.1.77.1.5.1</u>	<u>Ophthalmic 8 bit Photography Image Storage</u>	<u>SOP Class</u>	<u>PS 3.4</u>
<u>1.2.840.10008.5.1.4.1.1.77.1.5.2</u>	<u>Ophthalmic 16 bit Photography Image Storage</u>	<u>SOP Class</u>	<u>PS 3.4</u>
<u>1.2.840.10008.5.1.4.1.1.77.1.5.3</u>	<u>Stereometric Relationship Storage</u>	<u>SOP Class</u>	<u>PS 3.4</u>

410

Add to PS3.6 the following Data Elements to Section 6, Registry of DICOM data elements:

Tag	Name	VR	VM	
(0028,0003)	Samples per Pixel Used	US	1	
(0022,0001)	Light Path Filter Pass-Through Wavelength	US	1	
(0022,0002)	Light Path Filter Pass Band	US	2	
(0022,0003)	Image Path Filter Pass-Through Wavelength	US	1	
(0022,0004)	Image Path Filter Pass Band	US	2	
(0022,0005)	Patient Eye Movement Commanded	CS	1	
(0022,0006)	Patient Eye Movement Command Code Sequence	SQ	1	
(0022,0007)	Spherical Lens Power	FL	1	
(0022,0008)	Cylinder Lens Power	FL	1	
(0022,0009)	Cylinder Axis	FL	1	
(0022,000A)	Emmetropic Magnification	FL	1	
(0022,000B)	Intra Ocular Pressure	FL	1	
(0022,000C)	Horizontal Field of View	FL	1	
(0022,000D)	Pupil Dilated	CS	1	
(0022,000E)	Degree of Dilation	FL	1	

Tag	Name	VR	VM	
(0022,0010)	Stereo Baseline Angle	FL	1	
(0022,0011)	Stereo Baseline Displacement	FL	1	
(0022,0012)	Stereo Horizontal Pixel Offset	FL	1	
(0022,0013)	Stereo Vertical Pixel Offset	FL	1	
(0022,0014)	Stereo Rotation	FL	1	
(0022,0015)	Acquisition Device Type Code Sequence	SQ	1	
(0022,0016)	Illumination Type Code Sequence	SQ	1	
(0022,0017)	Light Path Filter Type Stack Code Sequence	SQ	1	
(0022,0018)	Image Path Filter Type Stack Code Sequence	SQ	1	
(0022,0019)	Lenses Code Sequence	SQ	1	
(0022,001A)	Channel Description Code Sequence	SQ	1	
(0022,001B)	Refractive State Sequence	SQ	1	
(0022,001C)	Mydriatic Agent Code Sequence	SQ	1	
(0022,001D)	Relative Image Position Code Sequence	SQ	1	
(0022,0020)	Stereo Pairs Sequence	SQ	1	
(0022,0021)	Left Image Sequence	SQ	1	
(0022,0022)	Right Image Sequence	SQ	1	

Part 16 Additions

CID 4200 Ophthalmic Imaging Agent

415

Context ID 4200
Ophthalmic Imaging Agent
Type: Extensible **Version: 20040921**

Coding Scheme Designator (0008,0102)	Code Value (0008,0100)	Code Meaning (0008,0104)
SRT	C-B02CC	Fluorescein
SRT	C-B0156	Indocyanine green
SRT	C-B0295	Rose Bengal
SRT	C-22853	Trypan blue
SRT	C-B02C5	Methylene blue

CID 4201 Patient Eye Movement Command

420

Context ID 4201
Patient Eye Movement Command
Type: Extensible **Version: 20040921**

Coding Scheme Designator (0008,0102)	Code Value (0008,0100)	Code Meaning (0008,0104)
SRT	R-1022D	Primary gaze
SRT	R-404BF	Upward gaze
SRT	R-404B9	Left upgaze
SRT	R-404BC	Left gaze
SRT	R-404B7	Left downgaze
SRT	R-404B6	Downgaze
SRT	R-404B8	Right downgaze
SRT	R-404BD	Right gaze
SRT	R-404BA	Right upgaze
SRT	R-10227	Convergent gaze

425

CID 4202 Ophthalmic Photography Acquisition Device

Context ID 4202

Ophthalmic Photography Acquisition Device

430

Type: Extensible

Version: 20040921

Coding Scheme Designator (0008,0102)	Code Value (0008,0100)	Code Meaning (0008,0104)
SRT	R-1021A	Fundus Camera
SRT	A-2B201	Biomicroscope
SRT	R-1021B	External Camera
SRT	R-1021C	Specular Microscope
SRT	A-2B210	Operating Microscope
SRT	A-00E8A	Scanning Laser Ophthalmoscope
SRT	R-1021D	Indirect Ophthalmoscope
SRT	R-1021E	Direct Ophthalmoscope
SRT	R-1021F	Ophthalmic Endoscope
SRT	A-00FCA	Keratoscope

CID 4203 Ophthalmic Photography Illumination

Context ID 4203

Ophthalmic Photography Illumination

435

Type: Extensible

Version: 20040921

Coding Scheme Designator (0008,0102)	Code Value (0008,0100)	Code Meaning (0008,0104)
SRT	R-1020E	Dual diffuse direct illumination
SRT	R-1020F	Fine slit beam direct illumination
SRT	R-10211	Broad tangential direct illumination
SRT	R-10213	Indirect sclerotic scatter illumination
SRT	R-10215	Indirect retroillumination from the iris
SRT	R-10217	Indirect retroillumination from the retina
SRT	R-10218	Indirect iris transillumination

Reference: From the OPS web site: <http://www.opsweb.org/Op-Photo/SlitLamp/SL/SlitLamp.htm>

440

CID 4204 Ophthalmic Filter

**Context ID 4204
Ophthalmic Filter**

445

Type: Extensible

Version: 20040921

Coding Scheme Designator (0008,0102)	Code Value (0008,0100)	Code Meaning (0008,0104)
DCM	111601	Green filter
DCM	111602	Red filter
DCM	111603	Blue filter
DCM	111604	Yellow-green filter
DCM	111605	Blue-green filter
DCM	111606	Infrared filter
DCM	111607	Polarizing filter
DCM	111609	No Filter

CID 4205 Ophthalmic Lens

**Context ID 4205
Ophthalmic Lens**

Type: Extensible

Version: 20040921

Coding Scheme Designator (0008,0102)	Code Value (0008,0100)	Code Meaning (0008,0104)
SRT	R-10219	Indirect ophthalmoscopy lens
SRT	R-10239	Concave contact fundus lens
SRT	R-1023A	Concave noncontact fundus lens
SRT	R-1023B	Contact fundus lens
SRT	A-00FAD	Goniolens
SRT	R-1023D	Convex noncontact fundus lens
SRT	R-1023E	Noncontact fundus lens
SRT	R-1023C	Convex contact fundus len

450

CID 4206 Ophthalmic Channel Description

Context ID 4206

Ophthalmic Channel Description

Type: Extensible

Version: 20040921

Coding Scheme Designator (0008,0102)	Code Value (0008,0100)	Code Meaning (0008,0104)
SRT	G-A12F	Blue
SRT	R-102C0	Full Spectrum
SRT	G-A11E	Green
SRT	R-102BE	Infrared
SRT	G-A11A	Red
SRT	G-A132	Red free
SRT	R-102BF	Ultraviolet

455

CID 4207 Ophthalmic Image Position

Context ID 4207

Ophthalmic Image Position

Type: Extensible

Version: 20040921

Coding Scheme Designator (0008,0102)	Code Value (0008,0100)	Code Meaning (0008,0104)
SRT	R-10229	Diabetic Retinopathy Study field 1
SRT	R-1022A	Diabetic Retinopathy Study field 2
SRT	R-1022B	Diabetic Retinopathy Study field 3
SRT	R-1022C	Diabetic Retinopathy Study field 4
SRT	R-1022E	Diabetic Retinopathy Study field 5
SRT	R-1022F	Diabetic Retinopathy Study field 6
SRT	R-10231	Diabetic Retinopathy Study field 7
DCM	111621	Field 1 for Joslin 3 field
DCM	111622	Field 2 for Joslin 3 field
DCM	111623	Field 3 for Joslin 3 field

460

CID 4208 Mydriatic Agent

Context ID 4208

Mydriatic Agent

Type: Extensible

Version: 20040921

465

Coding Scheme Designator (0008,0102)	Code Value (0008,0100)	Code Meaning (0008,0104)
SRT	C-677B9	Atropine
SRT	C-677C0	Homatropine
SRT	C-97520	Cyclopentolate
SRT	C-68165	Phenylephrine
SRT	C-97580	Tropicamide

CID 4209 Ophthalmic Anatomic Structure Imaged

Context ID 4209

Ophthalmic Anatomic Structure Imaged

Type: Extensible

Version: 20040921

470

Coding Scheme Designator (0008,0102)	Code Value (0008,0100)	Code Meaning (0008,0104)
SRT	T-AA050	Anterior chamber of eye
SRT	T-AA180	Both eyes
SRT	T-AA310	Choroid of eye
SRT	T-AA400	Ciliary body
SRT	T-AA860	Conjunctiva
SRT	T-AA200	Cornea
SRT	T-AA000	Eye
SRT	T-AA810	Eyelid
SRT	T-AA621	Fovea centralis
SRT	T-AA500	Iris
SRT	T-AA862	Lacrimal caruncle
SRT	T-AA910	Lacrimal gland
SRT	T-AA940	Lacrimal sac
SRT	T-AA700	Lens
SRT	T-AA830	Lower Eyelid
SRT	T-45400	Ophthalmic artery
SRT	T-AA630	Optic nerve head
SRT	T-AA610	Retina
SRT	T-AA110	Sclera
SRT	T-AA820	Upper Eyelid

CID 7202 Source Image Purposes of Reference

475

Context ID 7202
Source Image Purposes of Reference
Type: Extensible Version: 20020904

Coding Scheme Designator (0008,0102)	Code Value (0008,0100)	Code Meaning (0008,0104)
DCM	121320	Uncompressed predecessor
DCM	121321	Mask image for image processing operation
DCM	121322	Source image for image processing operation
<u>DCM</u>	<u>121329</u>	<u>Source image for montage</u>

480 **CID 29 Acquisition Modality**

Context ID 29
Acquisition Modality
Type: Extensible Version: ~~20030408~~20040921

Coding Scheme Designator	Code Value	Code Meaning
DCM	EPS	Cardiac Electrophysiology
DCM	CR	Computed Radiography
DCM	CT	Computed Tomography
DCM	DX	Digital Radiography
DCM	ECG	Electrocardiography
DCM	ES	Endoscopy
DCM	XC	External-camera Photography
DCM	GM	General Microscopy
DCM	HD	Hemodynamic Waveform
DCM	IO	Intra-oral Radiography
DCM	IVUS	Intravascular Ultrasound
DCM	MR	Magnetic Resonance
DCM	MG	Mammography
DCM	NM	Nuclear Medicine
<u>DCM</u>	<u>OP</u>	<u>Ophthalmic Photography</u>
DCM	PX	Panoramic X-Ray
DCM	PT	Positron emission tomography
DCM	RF	Radiofluoroscopy
DCM	RG	Radiographic imaging

DCM	RTIMAGE	Radiotherapy Image
DCM	SM	Slide Microscopy
DCM	US	Ultrasound
DCM	XA	X-Ray Angiography

Add the following definitions to Part 16 Annex D DICOM Controlled Terminology Definitions (Normative)

490

Annex D DICOM Controlled Terminology Definitions (Normative)

Code Value	Code Meaning	Definition	Notes
OP	Ophthalmic photography	Ophthalmic photography modality	
FA	<i>Fluorescein Angiography</i>	<i>Fluorescein Angiography</i>	<i>Retired-replaced by OP</i>
FS	<i>Fundoscopy</i>	<i>Fundoscopy</i>	<i>Retired-replaced by OP</i>
SMR	Stereometric Relationship	Stereometric image pairing modality	
121329	Source Image for Montage	Image used as a source for a montage (stitched) image	
111601	Green filter	Filter that transmits one third of white light (green) while blocking the other two thirds	
111602	Red filter	Filter that transmits one third of white light (red) while blocking the other two thirds	
111603	Blue filter	Filter that transmits one third of white light (blue) while blocking the other two thirds	
111604	Yellow-green filter	A filter of 560nm that is used for retinal imaging and can provide good contrast and good visibility of the retinal vasculature	
111605	Blue-green filter	A filter of 490nm that is used for retinal imaging because of excessive scattering of some retinal structures at very short wavelengths	
111606	Infrared filter	Filter that transmits the infrared spectrum, which is light that lies outside of the visible spectrum, with wavelengths longer than those of red light, while blocking visible light	
111607	Polarizing filter	A filter that reduces reflections from non-metallic surfaces such as glass or water by blocking light waves that are vibrating at selected angles to the filter.	
111609	No filter	No filter used	
111621	Field 1 for Joslin	Joslin NM-1 is a 45 degree field focused centrally between the temporal margin of optic disc and the center of the macula: Center the camera on the papillomacular bundle midway between the temporal margin	

		of the optic disc and the center of the macula. The horizontal centerline of the image should pass directly through the center of the disc	
111622	Field 2 for Joslin	Joslin NM-2 is a 45 degree field focused superior temporal to the optic disc: Center the camera laterally approximately one-half disc diameter temporal to the center of the macula. The lower edge of the field is tangent to a horizontal line passing through the upper edge of the optic disc. The image is taken temporal to the macula but includes more retinal nasal and superior to the macula than standard field 2.	
111623	Field 3 for Joslin	Joslin NM-3 is a 45 degree field focused nasal to the optic disc: This field is nasal to the optic disc and may include part of the optic disc. The horizontal centerline of the image should pass tangent to the lower edge of the optic disc.	