

# **Digital Imaging and Communications in Medicine (DICOM)**

*Supplement 221: Dermoscopy [WI 2019-04-C]*

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**DICOM Standards Committee**

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Date of this version
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To Do
<ul style="list-style-type: none"> <li>• Dermoscopy Skin Cancer Acquisition Context - SNOMED-RT ID columns</li> </ul>
Open issues
<ul style="list-style-type: none"> <li>• Should (0028,0302) <i>Recognizable Visual Feature</i> be set to true if image contains a tattoo? If yes, add to Content constraint. [A dermoscopy image due to small field of view is unlikely to contain enough of a tattoo to be recognizable. However, this may be a question for clinical images/VL Photographic objects]</li> <li>• It is sometimes necessary to take multiple dermoscopy images to get full coverage of a skin lesion (mole). Do we link/relate these multiple partial images of a skin lesion? Could Referenced Image Sequence (0008,1140) be a method for doing this?</li> <li>• How do we encode digital zoom?</li> </ul>
Closed issues
<ul style="list-style-type: none"> <li>• Will multi-frame ever be used? [Response: No dermoscopy is single frame only]</li> <li>• Due to field of view for dermoscopy it unlikely to include enough area (e.g. of face) to be recognizable. Should (0028,0302) <i>Recognizable Visual Feature</i> be deleted if not need for tattoo? [Response: Need to consider dermoscopy of fingerprints to be a recognizable visual feature, therefore need to include].</li> <li>• Do we group images of the same lesion acquired via different techniques (e.g. contact / non-contact polarized /non-polarized light) to be in the one series or multiple series?[Response: All images of a lesion will be in one series.]</li> <li>• Are dermoscopes calibrated? If yes, General Equipment module attributes Date Of Last Calibration, Time Of Last Calibration (Type 3 attributes) can be used.[Response: Lens is calibrated but camera (eg. iPhone, DSLR) is not.]</li> <li>• Do we want Burned in Annotation, Lossy Image Compression and Lossy Image Compression Ratio and Lossy Compression Method to be mandatory attributes?[Response: Only Lossy Image Compression is Type 1]</li> <li>• What (if any) EXIF tags do we want included in the Dermoscopic Image module? [Response: Include VL Photographic Acquisition Module in Dermoscopy Photography IOD to encode EXIF tags if required]</li> <li>• Should we make date and time mandatory to aid in sequential dermoscopic imaging review? [Response: Study Date (0008,0020) and Study Time (0008,0030) are Type 2 attributes in the General Study Module]</li> <li>• Do we need a Frame of Reference IE? [Response: Include in Dermoscopy Photography IOD as Type U for when multiple exposures of the same lesion are taking during the same acquisition. Note: Some dermoscopes “automatically” acquire multiple images under different lighting modes.]</li> <li>• Do we need a Dermoscopy Photography Equipment Module? As an example, the VL Photographic Equipment Module contains description of the lens (e.g. Lens Specification, Lens Make, Lens Model and Lens Serial Number). Alternatively, can we use Software Versions (0018,1020) which is a multi-valued attribute. For equipment that is composed of several</li> </ul>

components, it may be used to identify the name and version for each of those components. This may also include the identifier and version of libraries or configuration files that significantly affect the production of the SOP Instance. [Add VL Photographic Equipment as a U for devices with interchangeable lenses]

Notes

- The attributes Manufacturer (0008,0070), Manufacturer's Model Name (0008,1090) and Device Serial Number (0018,1000) are intended to be a primary identification of the system
- Patient Orientation (0020,0020) Type 2C in General Image Module (required if Image Orientation (0020,0037) or Image Position (Patient) (0020,0032). These later two attributes will not be encoded for a dermoscopy image and therefor 0020,0020 will be required.
- Body Part Examined (0018,0015) Type 3 in General Series Module. Can be used for more generic anatomical region. Text description of the part of body examined.
- Laterality (0020,0060) Type 2C in General Series Module (Required if the body part examined is a paired structure and Image Laterality (0020,0062) ... not present.
- Convention: Type 1 Data Elements that shall be included and are mandatory elements; Type 2 Data Elements that shall be included and are mandatory Data Elements. However, it is permissible that if a Value for a Type 2 element is unknown it can be encoded with zero; Type 3 Data Elements that are optional Data Elements.

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## Scope and Field of Application

5 Dermoscopy is a diagnostic technique that enables visualization of the morphological structures of the skin. Dermoscopy (also known as dermatoscopy and epiluminescence microscopy) is a non-invasive, in vivo skin examination that has demonstrated to be an important aid in the early recognition of malignant melanoma and other skin tumors. Dermoscopy is also used for disease conditions (e.g. inflammatory) other than skin cancer.

10 A dermoscope is hand-held device that consists of magnifier and light source. Emitted light can be polarized light or non-polarized. Dermoscopic examination can be by direct contact with skin or non-contact. Dermoscopy using non-polarized light require direct contact between the skin and the device. For direct contact dermoscopy an immersion medium is placed on the skin surface and a glass plate on the dermoscope is placed directly against the skin. Non-contact dermoscopy does not require the dermoscope to be in contact with the skin surface. Three techniques are used in dermoscopy: polarized non-contact dermoscopy, polarized contact dermoscopy, and non-polarized contact dermoscopy.

15 This Supplement to the DICOM Standard introduces a new IOD and a new storage SOP for encoding and storing dermoscopic images.

**Changes to NEMA Standards Publication PS 3.2**

20

**Digital Imaging and Communications in Medicine (DICOM)**

**Part 2: Conformance**

**Item: Add to table A.1-2 categorizing SOP Classes:**

The SOP Classes are categorized as follows:

25

**Table A.1-2  
UID VALUES**

<b>UID Value</b>	<b>UID NAME</b>	<b>Category</b>
1.2.840.10008.xxx	Dermoscopic Photography Image Storage	Transfer

**Changes to NEMA Standards Publication PS 3.3**

**Digital Imaging and Communications in Medicine (DICOM)**

**Part 3: Information Object Definitions  
Part 3 Additions**

30

*Add*

35

*Modify PS3.3 Annex A*

**A.XX Dermoscopic Photography Image Information Object Definition**

**A.XX.1 Dermoscopic Photography Image IOD Description**

40

The Dermoscopic Photography Image Information Object Definition (IOD) specifies an image that has been created using a dermoscope. The dermoscope may be a dedicated dermoscopic device, or a camera-attached or smart device-attached dermoscope.

**A.XX.2 Dermoscopic Photography Image IOD Description Entity-Relationship Model**

45

The Dermoscopic Photography Image IOD uses the DICOM Composite Instance IOD Entity-Relationship Information Model defined in Section A.1.2, with only the Image IE below the Series IE.

**A.XX.3 Dermoscopic Photography Image IOD Modules**

Table A.XX-1 specifies the Modules of the Dermoscopic Photography Image IOD.

**Table A.XX-1  
DERMOSCOPIC PHOTOGRAPHY IMAGE IOD MODULES**

IE	Module	Reference	Usage
Patient	Patient	C.7.1.1	M
	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
	Clinical Trial Series	C.7.3.2	U
Frame of Reference	Frame of Reference	C.7.4.1	U
Equipment	General Equipment	C.7.5.1	M
	VL Photographic Equipment	C.8.12.10	U
Image	General Image	C.7.6.1	M
	Image Pixel	C.7.6.3	M
	Acquisition Context	C.7.6.14	U
	Dermoscopic Image	C.8.xx.1	M



	VL Photographic Acquisition Module	C.8.12.11-1	U
	ICC Profile	C.11.15	U
	SOP Common	C.12.1	M
	Common Instance Reference	C.12.2	U

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**A.XX.4 Dermoscopic Photography Image IOD Content Constraints**

**A.XX.4.1 Modality**

The value of Modality (0008,0060) shall be DMS.

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**A.XX.4.2 Recognizable Visual Features**

The value of Recognizable Visual Features (0028,0302) shall be YES if the image contains the patient's fingerprints.

60

**A.XX.4.3 Frame of Reference Module**

The frame of reference module may be used if multiple successive images are acquired during a single acquisition. For example during acquisition multiple images are acquired under different lighting modes. All images of a skin lesion in an imaging study are encoded as the same Series. All images in a Series that share the same Frame of Reference UID shall be spatially related to each other.

65

**A.XX.4.4 Acquisition Context Module**

For Acquisition Context Sequence (0040,0555) the Defined TID is **TID xxx** "Dermoscopy Skin Cancer Acquisition Context, which encodes patient level and lesion level information related to skin cancer.

70

**A.XX.4.5 VL Photographic Equipment Module**

The VL Photographic Equipment Module shall be used to encode Lens attributes when a dermoscope has interchangeable lenses.

**A.XX.4.6 VL Photographic Acquisition Module**

The VL Photographic Acquisition Module shall be used to encode EXIF attributes.

75

**A.XX.4.7 ICC Profile Module**

The ICC Profile Module shall be present for color images. If the color space to be used is not calibrated (i.e., a device-specific ICC Input Profile is not available), then an ICC Input Profile specifying a well-known space (such as sRGB) may be specified.

80

*Modify PS3.3 C.8 Modality Specific Modules*

**C.8.XX Dermoscopic Photography Modules**

85

This section describes the Dermoscopic Image Module. This module contains Attributes that are specific to Dermoscopic Photography images. There is no Dermoscopic Photography Equipment Module.

**C.8.XX.1 Dermoscopic Image Module**

Table C.8-x contains IOD Attributes that describe dermoscopic images.

90

**Table C.8-x. Dermoscopic Image Module Attributes**

<b>Attribute Name</b>	<b>Tag</b>	<b>Type</b>	<b>Attribute Description</b>
Recognizable Visual Features	(0028,0302)	2	Indicates whether or not the image contains sufficiently recognizable visual features to allow the image or a reconstruction from a set of images to identify the Patient. Enumerated Values:  If this Attribute is absent, then the image may or may not contain recognizable visual features
Lossy Image Compression	(0028,2110)	1	Specifies whether an Image has undergone lossy compression (at a point in its lifetime). Enumerated Values: 00 Image has NOT been subjected to lossy compression. 01 Image has been subjected to lossy compression. Once this value has been set to 01 it shall not be reset. See Section C.7.6.1.1.5.
Polarization	(gggg,eeee)	2	Indicates the polarization of the dermoscope light source. Enumerated Values: POLARIZED NON-POLARIZED
Emitter Color Temperature	(gggg,eee)	2	Indicates the color temperature of dermoscope light source in Kelvin.
Contact Method	(gggg,eee)	2	Indicates if the image was acquired with the dermoscope in direct contact with the skin Enumerated Values: CONTACT NON-CONTACT

Immersion Media	(gggg,eee)	2C	<p>The interface between the dermoscope and the skin surface for images acquired with contact dermoscopy.</p> <p>Enumerated Values:</p> <p>ULTRASOUND GEL</p> <p>ALCOHOL</p> <p>WATER</p> <p>MINERAL OIL</p> <p>PLASTIC CAP</p> <p>Conditional on (gggg,eeee) Contact Method is CONTACT</p>
Pixel Spacing	(0028,0030)	2	Physical distance in the imaging target (patient or specimen) between the center of each pixel, specified as a numeric pair - adjacent row spacing \ adjacent column spacing, in mm. See Section 10.7.1.3.
Optical Magnification Factor	(gggg,eee)	2	A number that indicates the magnification factor of the dermoscope in times (X).
Lesion Coverage	(gggg,eee)	2	<p>Indicates whether acquired image covers the entire skin lesion or part of the lesion.</p> <p>Enumerated Values:</p> <p>PARTIAL</p> <p>FULL</p>
Anatomical Region Sequence	(0008, 2218)	2	<p>Sequence that identifies the anatomic region of interest in this Instance (i.e., external anatomy, surface anatomy, or general region of the body).</p> <p>Zero or one Item shall be included in this Sequence.</p>
>Include Table 8.8-1 "Code Sequence Macro Attributes"			<p>CID 4029 "Dermatology Anatomic Sites" is defined for for dermatology applications.</p> <p>CID 4031 "Common Anatomic Regions" for humans</p>
>Anatomic Region Modifier Sequence	(0008,2220)	3	<p>Sequence of Items that modifies the anatomic region of interest of this Instance</p> <p>One or more Items are permitted in this sequence.</p>
>>Include Table 8.8-1 "Code Sequence Macro Attributes"			Defined CID 2 "Anatomic Modifier", unless otherwise defined in the macro invocation.
Include Table 10-8 "Primary Anatomic Structure Macro Attributes"			Context ID may be defined in the macro invocation

**Changes to NEMA Standards Publication PS 3.4**

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**Digital Imaging and Communications in Medicine (DICOM)**

**Part 4: Service Class Specifications**

*Add to PS3.4 Annex B.5.*

**B.5 Standard SOP Classes**

100

**Table B.5-1  
STANDARD SOP CLASSES**

<b>SOP Class Name</b>	<b>SOP Class UID</b>	<b>IOD (See PS 3.3)</b>
Dermoscopic Photography Image Storage	1.2.840.10008.XXXX	Dermoscopic Photography Image IOD

*Add to PS3.4 Annex I.4.*

105

**I.4 Media Standard Storage SOP Classes**

**Table I.4-1  
Media Storage Standard SOP Classes**

<b>SOP Class Name</b>	<b>SOP Class UID</b>	<b>IOD (See PS 3.3)</b>
Dermoscopic Photography Image Storage	1.2.840.10008.XXXX	Dermoscopic Photography Image IOD

110

**Changes to NEMA Standards Publication PS 3.6**  
**Digital Imaging and Communications in Medicine (DICOM)**  
**Part 6: Data Dictionary**

Add to PS3.6 Annex A

115

UID Value	UID NAME	UID TYPE	Part
1.2.840.10008.xxx	Dermoscopic Photography Image Storage	SOP Class	PS 3.4

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

Tag	Name	Keyword	VR	VM	
(gggg,eeee)	Polarization	Polarization	CS	1	
(gggg,eeee)	Emitter Color Temperature	EmitterColorTemperature	LO	1	
(gggg,eeee)	Contact Method	ContactMethod	CS	1	
(gggg,eeee)	Immersion Media	ImmersionMedia	CS	1-n	
(gggg,eeee)	Optical Magnification Factor	OpticalMagnificationFactor	IS	1	
(gggg,eeee)	Lesion Coverage	LesionCoverage	CS	1	

120

**Changes to NEMA Standards Publication PS 3.16**

**Digital Imaging and Communications in Medicine (DICOM)**

125

**Part 16 Content Mapping Resource**

Add to PS3.16 Annex B

**Annex B DCMR Context Groups (Normative)**

130

**CID XXX Skin type Fitzpatrick**

Resources: HTML| FHIR JSON|FHIR XML|IHE SVS XML  
Type: Extensible  
Version: 2020xxxx  
UID: 1.2.840.10008.xxx

135

Coding Scheme Designator	Code Value	Code Meaning	SNOMED-RT ID	UMLS Concept Unique ID
LNC	LA15337-1	Skin-type I: very fair skin, blond or red hair, light eyes (blue or green), never tan and always sunburn after sun exposure		C2700185
LNC	LA15338-9	Skin-type II: fair skin, blond or light-brown hair, light eyes (blue or green), usual sunburn		C2700186
LNC	LA15339-7	Skin-type III: deep skin, brown hair, light to medium eye color		C2700187
LNC	LA15340-5	Skin-type IV: olive skin, dark-brown hair, brown eyes		C2700188
	LA15341-3	Skin-type V: brown skin, black hair, black eyes		C2700189
LNC	LA15342-1	Skin-type VI: black skin, black hair, black eyes		C2700190

140 **CID XXX History of Malignant Melanoma**

Resources: HTML| FHIR JSON|FHIR XML|IHE SVS XML  
 Type: Extensible  
 Version: 2020xxxx  
 UID: 1.2.840.10008.xxx

145

Coding Scheme Designator	Code Value	Code Meaning	SNOMED-RT ID	UMLS Concept Unique ID
SCT	161432005	History of malignant melanoma		C0457969
SCT	321000119108	History of malignant melanoma of the skin		C3266389

**CID XXX History of Melanoma in Situ**

Resources: HTML| FHIR JSON|FHIR XML|IHE SVS XML  
 Type: Extensible  
 Version: 2020xxxx  
 UID: 1.2.840.10008.xxx

150

Coding Scheme Designator	Code Value	Code Meaning	SNOMED-RT ID	UMLS Concept Unique ID
SCT	1251000119106	History of melanoma in situ of the skin		C3266774

155 **CID XXX History of Non-Melanoma Skin Cancer**

Resources: HTML| FHIR JSON|FHIR XML|IHE SVS XML  
 Type: Extensible  
 Version: 2020xxxx  
 UID: 1.2.840.10008.xxx

160

Coding Scheme Designator	Code Value	Code Meaning	SNOMED-RT ID	UMLS Concept Unique ID
SCT	428053000	History of malignant basal cell neoplasm of skin		C1997258
SCT	429024007	History of squamous cell carcinoma of skin		C1998384

SCT	443895001	History of malignant neoplasm of skin excluding melanoma (situation)		C2732359
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**CID XXX Skin Disorders**

165

**Resources:** HTML| FHIR JSON|FHIR XML|IHE SVS XML  
**Type:** Extensible  
**Version:** 2020xxxx  
**UID:** 1.2.840.10008.xxx

Coding Scheme Designator	Code Value	Code Meaning	SNOMED-RT ID	UMLS Concept Unique ID
SCT	43982006	Solar degeneration (disorder)		C0546380
SCT	254819008,	Atypical mole syndrome (disorder)		C0013403
SCT	782823001	Familial cutaneous telangiectasia and oropharyngeal cancer predisposition syndrome (disorder)		C5190630
SCT	69408002	Gorlin syndrome (disorder)		C0004779
SCT	722859001	PTEN hamartoma tumor syndrome (disorder)		C1959582
SCT	721904001	Rombo syndrome (disorder)		C1867147

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**CID XXX Patient Reported Lesion Characteristics**

**Resources:** HTML| FHIR JSON|FHIR XML|IHE SVS XML  
**Type:** Extensible  
**Version:** 2020xxxx  
**UID:** 1.2.840.10008.xxx

175

Coding Scheme Designator	Code Value	Code Meaning	SNOMED-RT ID	UMLS Concept Unique ID
SCT	418290006	Itching		C0033774
SCT	386713009	Red Color		C0332575
SCT	263703002	Changed		C0443172

**Note**

(263703002, SCT, “Changed status (qualifier value)”) is used to identify evolution and/or morphological changes in lesion



180 **CID XXX Lesion Palpation Characteristics**

Resources: HTML| FHIR JSON|FHIR XML|IHE SVS XML  
 Type: Extensible  
 Version: 2020xxxx  
 UID: 1.2.840.10008.xxx

185

Coding Scheme Designator	Code Value	Code Meaning	SNOMED-RT ID	UMLS Concept Unique ID
SCT	20583004	Firm		C0205233
SCT	260399008	Raised		C0442818

**CID XXX Topical Skin Treatments**

190 Resources: HTML| FHIR JSON|FHIR XML|IHE SVS XML  
 Type: Extensible  
 Version: 2020xxxx  
 UID: 1.2.840.10008.xxx

Coding Scheme Designator	Code Value	Code Meaning	SNOMED-RT ID	UMLS Concept Unique ID
SCT	386439008	Skin care: topical treatments (regime/therapy)		C0150349

195 **CID XXX Skin Procedures**

Resources: HTML| FHIR JSON|FHIR XML|IHE SVS XML  
 Type: Extensible  
 Version: 2020xxxx  
 UID: 1.2.840.10008.xxx

200

Coding Scheme Designator	Code Value	Code Meaning	SNOMED-RT ID	UMLS Concept Unique ID
SCT	302396003	Cryotherapy to skin lesion (procedure)		C0411410
SCT	240977001	Biopsy of skin (procedure)		C0150866
SCT	428604001	Photodynamic therapy of skin (procedure)		C1998192

*Modify tables in PS3.16 Annex B*

205 **CID 6099 Racial Group**

Resources: HTML| FHIR JSON|FHIR XML|IHE SVS XML  
 Type: Extensible  
 Version: 2020xxxx  
 UID: 1.2.840.10008.6.1.1278

210

Add new rows

Coding Scheme Designator	Code Value	Code Meaning	SNOMED-RT ID	UMLS Concept Unique ID
....				
SCT	413581001	Asian or Pacific islander		C1531604
SCT	413600007	Australian aborigine		C0337948
SCT	414408004	Hispanic		C0086409
SCT	414481008	Indian		C1524069
SCT	414752008	Mixed racial group		C0682081
SCT	415226007	Race not stated		C0425378
SCT	415794004	Unknown racial group		C1532697

215

Note

Indian refers to a person having origins in the original peoples of the Indian sub-continent.

Add to PS3.16 Annex C

220

### Annex C Acquisition Context Module, Protocol and Workflow Context Templates (Normative)

This section defines an Acquisition Context Template for Skin Cancer. The attributes in this template represent values known at the time of image acquisition. Hence, these values may subsequently change.

225

#### TID XXXX Dermoscopy Skin Cancer Acquisition Context

230

Type: Extensible  
Order: Non-Significant  
Root: No

Table TID <#>. Skin Cancer Acquisition Context

235

Row Number	VT	Concept Name	VM	Req Type	Condition	Value Set Constraint
1	CODE	DT (66555-4, LNC, "Skin type Fitzpatrick ")	1	U		BCID xxx Skin Type Fitzpatrick

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2	CODE	DT (415229000, SCT " Racial group")	1	U		BCID 6099 Racial Group
3	CODE	DT (392521001, SCT, "History of (contextual qualifier) (qualifier value)")	1	U		BCID xxx History of Malignant Melanoma
4	NUMERIC	DT (NMM, DCM, "Number of Malignant Melanomas")	1	UC	IIF Row 3 is present	
5	CODE	DT (392521001, SCT, "History of (contextual qualifier) (qualifier value)")	1	U		BCID xxx History of Melanoma in Situ
6	NUMERIC	DT (NMIS, DCM, "Number of Melanoma in Situ")	1	UC	IIF Row 5 is present	
7	CODE	DT (392521001, SCT, "History of (contextual qualifier) (qualifier value)")	1-n	U		BCID xxx History Non-Melanoma Skin Cancer
8	CODE	DT (64572001, SCT, "Disease")	1-n	U		BCID xxx Skin Disorders
9	CODE	DT(416471007, SCT, "Family history of clinical finding")	1	U		BCID xxx History of Malignant Melanoma
10	NUMERIC	(C19767,NCIt, "Number of First Degree Relatives (Affected)")	1	UC	IIF Row 9 is present	
11	CODE	DT(416471007, SCT, "Family history of clinical finding")	1	U		BCID xxx History of Melanoma in Situ
11	CODE	DT(416471007, SCT, "Family history of clinical finding")	1	U		BCID xxx History Non-Melanoma Skin Cancer

12	CODE	DT (418799008, SCT, “Findings reported by patient/informant”)	1-n	U		BCID xxx Patient Reported Lesion Characteristics
13	CODE	DT (113011001, SCT, “Palpation (procedure) “)	1-n	U		BCID xxx Lesion Palpation Characteristics
14	CODE	DT (225360001, SCT, “Skin care (regime/therapy) “)	1-n	U		BCID xxxx Topical Skin Treatments
15	CODE	DT (118718002, SCT, “Procedure on skin (procedure)”	1-n	U		BCID xxx Skin Procedures

Note

Rows 1 – 8 are patient level attributes

Rows 9 – 12 are lesion level attributes

240

*Add the following definitions to Part 16 Annex D DICOM Controlled Terminology Definitions (Normative) – Modify Table D-1 and Modify Table CID 29. Acquisition Modality*

245

## Annex D DICOM Controlled Terminology Definitions (Normative)

**Table D-1. DICOM Controlled Terminology Definitions (Coding Scheme Designator “DCM” Coding Scheme Version “01”)**

Code Value	Code meaning	Definition	Notes
...			
DMS	Dermoscopy	An image acquired using a dermoscope	
NMM	Number of malignant melanomas	The number of malignant melanoma a person has had diagnosed	
NMIS	Number of melanoma in situ	The number of in situ melanoma a person has had diagnosed	

250

## CID 29 Acquisition Modality

Table CID 29. Acquisition Modality

Coding Scheme Designator	Code Value	Code Meaning
...		
DCM	DMS	Dermoscopy

255

## Changes to NEMA Standards Publication PS 3.17

### Digital Imaging and Communications in Medicine (DICOM)

#### Part 17: Explanatory Information

260

*Add to PS3.17 Annex XXX*

## Annex XXX Dermoscopy (Informative)

### X.1 Measurements

265

Dermoscopy images can be acquired with the dermoscope in direct contact with the patients skin or not. Contact dermoscopes have a glass contact plate which contacts the skin via a liquid interface (immersion media). Some vendors include a millimeter measurement scale which is etched or imprinted onto the glass contact plate. Resultant images include the scale as shown in Figure X.1. This scale can be used to calibrate measurement tools in display software.

270



### Figure X.1-1 Dermoscopy image including scale

275 An alternative way to support distance measurements is when the vendor encodes the Pixel  
Spacing (0028,0030) attribute with the physical distance between the centre of adjacent pixels as  
defined in 10.7.1.3. If Pixel Spacing contains a value then measurements tools in the display  
software do not need to calibrate against an object of known size (e.g. millimeter measurement  
scale) to be able to provide a distance measurement. Pixel Spacing can be geometrically  
280 calculated when there is a known source-to-object distance as would occur with contact  
dermoscopy. Some non-contact dermoscopes also have fixed distance lens cones which also  
make it possible to geometrically calculate pixel spacing. It is difficult to accurately calculate pixel  
spacing when the source-to-object distance is not fixed.

## X.2 Use Cases

### Use Case 1: Linking dermoscopy images to a regional image

285 A regional or contextual image is a clinical photograph that includes anatomic reference points  
(e.g. joint or navel) in the field of view. Dermoscopy images are typically of a single skin lesion  
(e.g. mole). Linking dermoscopy images to a regional image can give the anatomical location of  
skin lesion. Further, the linkage may help with the consistent identification of individual skin  
lesions in sequential dermoscopy.

290 A regional image may include one or more skin lesions. A skin lesion may be seen in one or more  
regional images. Therefore the relationship between the regional image and the linked  
dermoscopy images is many-to-many.



Figure X.2-1 Regional image

295 **Potential acquisition workflow.** The aim of this workflow is to create a link between the regional  
image/s and the dermoscopic image/s.

Steps:

1. A regional image is acquired and displayed on the imaging modality.

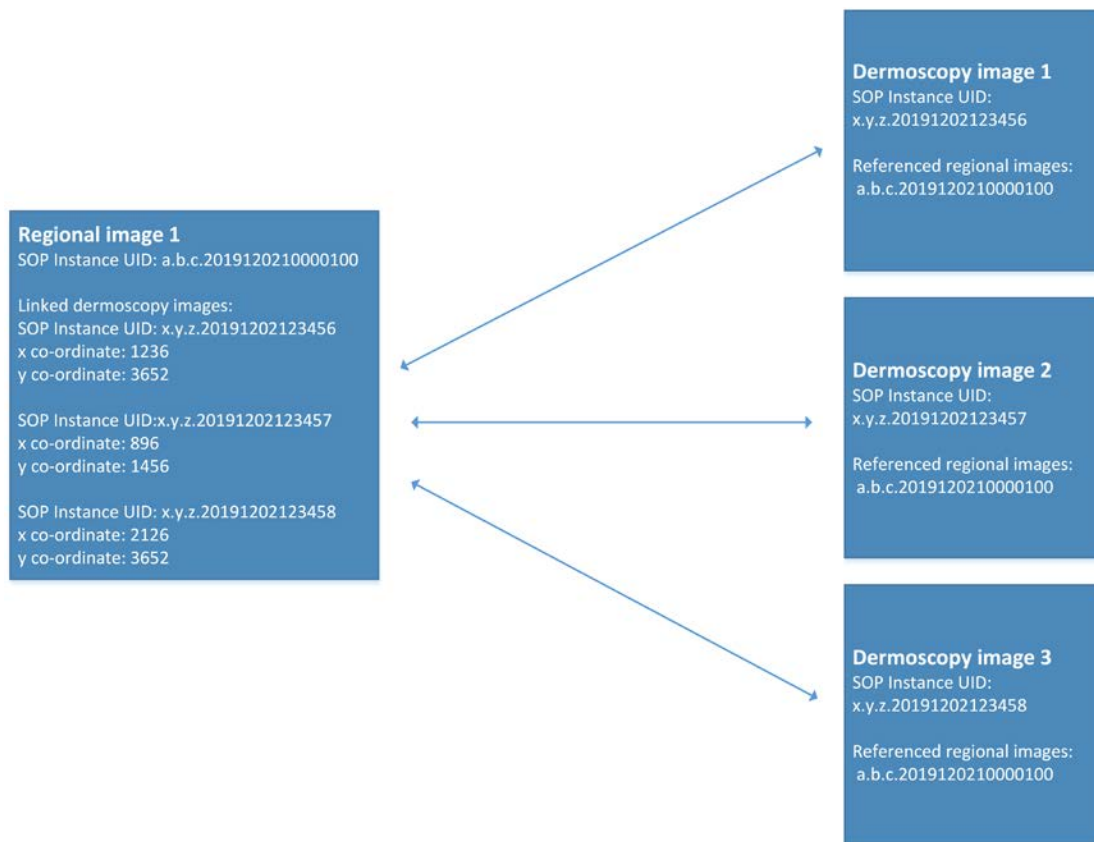
300 A skin lesion requiring dermoscopy is identified (e.g. by mouse click). The user is optionally  
prompted to input a skin lesion identifier (e.g. Lesion 1). [Do we need to optionally encode  
lesion\_UID in the image metadata? Or presentation state or other? Yes – this is necessary (VR)]

The skin lesion identifier could be used as the series descriptor of the dermoscopy images of this skin lesion. The mouse click generates an x- and y-co-ordinate to encode in the metadata.

1. A dermoscopy image is acquired and linked to the lesion identified in Step 2.

305 Considerations:

- The metadata of the regional images contains all referenced dermoscopy images (SOP Instance UID).
- The metadata of the dermoscopy image contains a referenced regional images (SOP Instance UID).
- 310 • The metadata of the regional image contains the x- and y- co-ordinate of the lesion.
- The metadata of the regional image optionally contains the skin lesion identifier.
- The dermatology imaging study consists one or more regional images and one or more dermoscopy images.
- 315 • Do you need a new regional image for each dermatology imaging study or could it be possible to re-use the original image?



**Figure X.2-2 Linkage between regional image/s and dermoscopy image/s within a dermatology imaging study**

320 **Potential display functionality.** When displaying a dermatology imaging study a user can click a skin lesion which hyperlinks to display the appropriate dermoscopic image.

NOTES

325 The Referenced Image Sequence (0008,1140) may provide a method for relating dermoscopy and regional images.