

Impact of Terminologies for Tumor Pathology Structured Reports

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Background

IHE and DICOM structured reports in anatomic pathology (APSR)

User-friendly implementation

Minimum requirements for standardisation

National networks vs international initiatives

Background (II)

Syntax and semantics

Standard vs non-standard in syntax

- HL7-CDA, DICOM

- XML

Incremental (variable) semantic interoperability (HL7 level 1-3)

What terminology??

Definitions

Terminology

- terms which give specific meanings in specific contexts

Nomenclature

- plus rules for building of terms

Classification

- hierarchic order of terms

Ontology

Structure IHE vs Path G

...

vs Specimen

Clinical information

Intraoperative observation

Macroscopic observation

vs Macroscopic description

Microscopic observation

vs Microscopic description

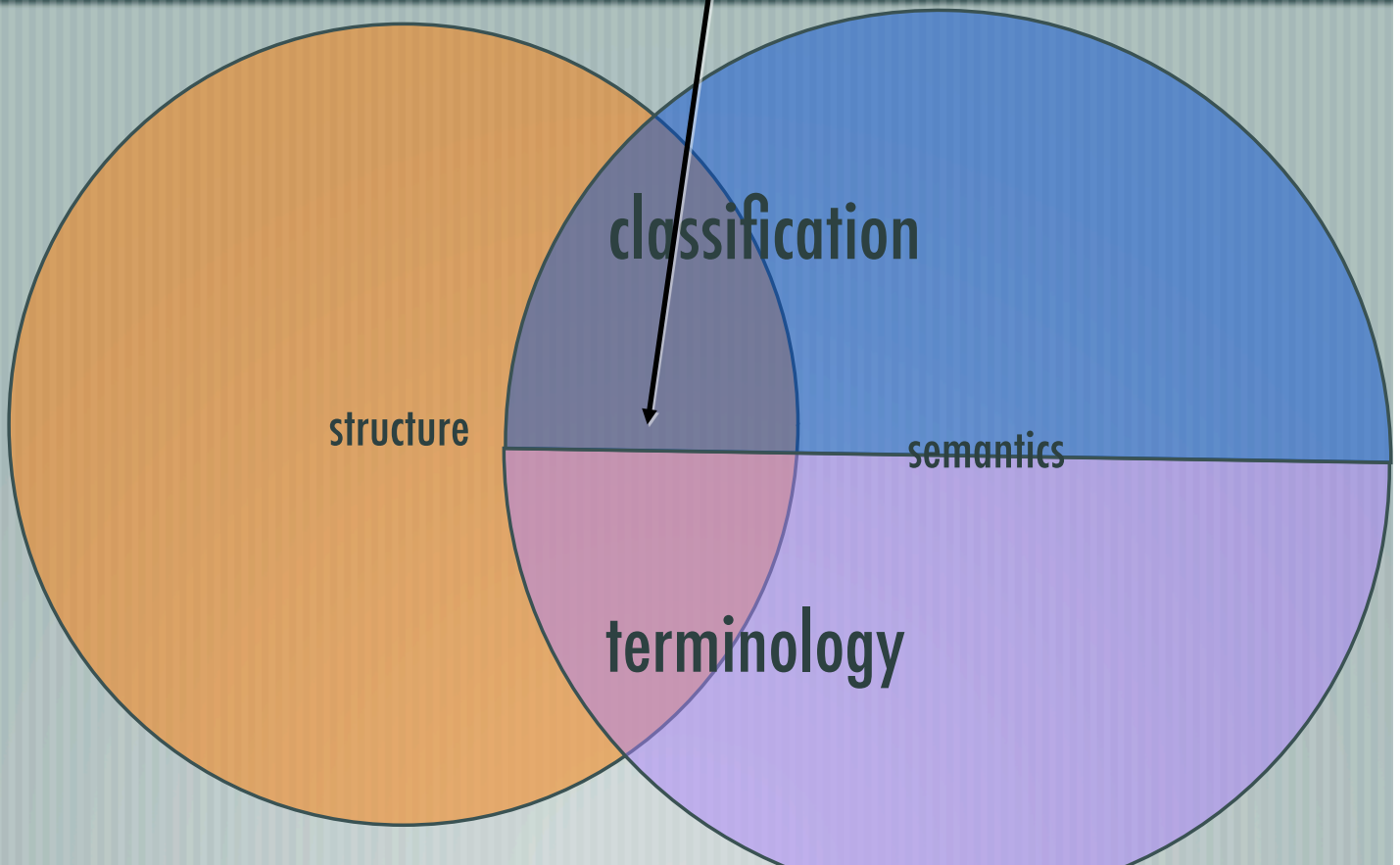
Diagnosis

vs Diagnosis

Procedure steps

Report textual summary

structured report



Terminologies

consisting of

- concepts (clearly separable contents with never changing concept IDs)
- terms
- relations

for exact representation of (pathologic) data

Terminologies

Reference terminologies

- systematic, comprehensive
 - UMLS
 - SNOMED CT
 - LOINC

Interface terminologies

- from a user viewpoint, application oriented

Terminologies

Mapping

- from interface to reference terminology
- from national developments to interface terminology

Pre- and Postcoordination

for exact representation of pathologic data in routine

Mapping BV-guidelines to PathLex

BV-guidelines (checklists) for

- breast cancer (49 terms)
- colorectal cancer (50 terms)
- prostate cancer (42 terms)

Mapping BV-guidelines to PathLex

PathLex

- 1 generic and 3 (out of 20) organ specific tumor templates
- 128 (out of 1700) terms for findings and procedures corresponding value sets
- in lacking mapping LOINC and SNOMED CT were screened

Mapping BV-guidelines to PathLex

Maligne Läsion, nicht invasiv (DCIS)

Kerngrading gering intermediär hoch

Komedonekrosen vorhanden nicht vorhanden

WHO-Grading Low Grade Intermed. Gr. High Grade

document name

Breast-In situ neoplasm-Histologic grade of ductal carcinoma in situ (DCIS)

value set ID

1.3.6.1.4.1.19376.1.8.5.23

PathLex Display Name

Grade I (low)

Grade II (intermediate)

Grade III (high)

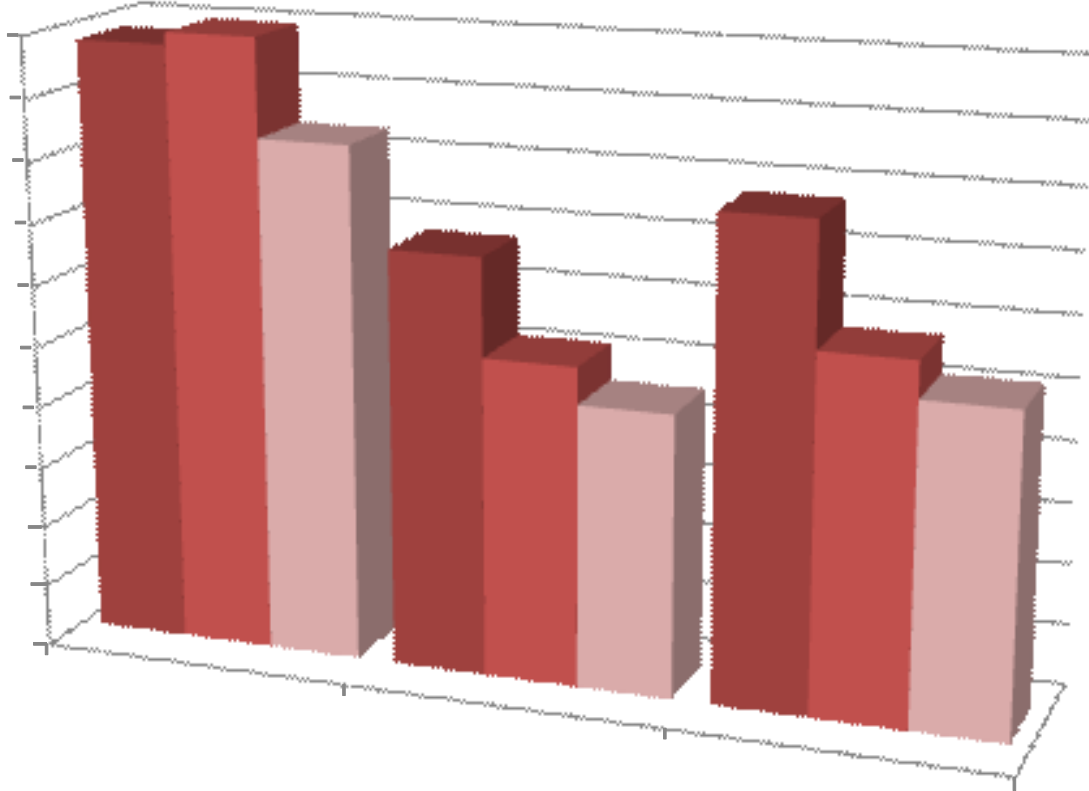
PathLex Code

743

744

745

PathLex Mapping



PathLex Mapping unsuccessful in

INV_MULTIZENT
BR_STANZ_TYP
BR_STANZ_NR
BR_STANZ_SEC_NR
BR_STANZ_LENGTH
BR_RADIOGR
BR_CALC_SIZE
BR_CALC_TYP
BR_LESION_BEN
BR_LESION_UNCERT
BR_CLASS_NHSBSP_
BR_CALC_CORREL
BR_CALC_CORREL_TYP
BR_SPEC_WEIGHT
BR_SPEC_MARK
LCIS_TYP

RESEKTION_TEILE
MESOREKTUM_EXZISION
PME_CONING
OBERFLAECHE_RESEKTAT
MESOREKTUM_QUALITAET
REKTUMEXSTIRPATION_QUALITAET
MERCURY_QUALITAET
SHA_MESSUNG_PME
N_MI_SUFFIX
M_LOKALISATION
NO_ZUSATZ
MO_ZUSATZ
N1_ZUSATZ
M1_ZUSATZ
VENENINVASION
R_RESEKTION
VERAENDERUNGEN_NICHTMALIGN
TNM_REVISION
ICD_O_REVISION
DIVERTIKEL
BIOPSIE_ANZAHL
POLYP_TYP

ANZ_STANZ
ANZ_STANZ_BEFALLEN
INF_KAPSEL
INF_PERIPROST
INF_VESIC
PIN_HG
PROSTATITIS_GRANULOM
ANZ_BLOCK
N_LOKALISATION
M_LOKALISATION
NO_ZUSATZ
MO_ZUSATZ
N1_ZUSATZ
M1_ZUSATZ
VENENINVASION
R_RESEKTION
INV_CRM_DIST_SITE

Pathlex Mapping Unsuccessful,

LOINC und SNOMED CT

255206009
122737001
399482008
BR_STANZ_SEC_NR
44619-5
80865008
9802-0
416320009
BR_LESION_BEN
BR_LESION_UNCERT
BR_CLASS_NHSBSP_
425911000
BR_CALC_CORREL_TYP
371506001
BR_SPEC_MARK
77284006

33747-7
395136002
PME_CONING
408655002
33730-3
REKTUMEXSTIRPATION_QUALITAET
MERCURY_QUALITAET
SHA_MESSUNG_PME
N_ML_SUFFIX
33733-7
NO_ZUSATZ
MO_ZUSATZ
N1_ZUSATZ
M1_ZUSATZ
33740-2
17964000
33744-4
TNM_REVISION
ICD_O_REVISION
33744-4
33747-7
POLYP_TYP

44652-6
44651-8
INF_KAPSEL
44627-8
44626-0
PIN_HG
PROSTATITIS_GRANULOM
443825005
N_LOKALISATION
33733-7
NO_ZUSATZ
MO_ZUSATZ
N1_ZUSATZ
M1_ZUSATZ
33740-2
17964000
33753-5

Basics for Pathology Terminologies

Elements of

grading systems

IHC and MP

staging systems

where no (or few) terminology attempts have been made far !

Elements of grading

e.g.

Grad	Zytologie/ Kerngrad (KG)	Nekrosen	Kalzifikationen	Architektur
Low-Grade	Kleine, monomorphe Zellen mit uniformen Kernen (KG 1)	-	Lamellär	Bögen, kribriform, solide und/oder mikropapillär
Intermediate-Grade	Zytologie ähnlich Low-Grade (KG 1)	+	Lamellär oder amorph	Solide, kribriform, mikropapillär
	Oder intermediärer Kerngrad (KG 2)	-/+		
High-Grade	Hochgradige Zelltypen mit pleomorphen Kernen (KG 3)	-/+	Amorph	Eine Zelllage, mikropapillär, kribriform oder solide

BV-guideline-Breast Cancer. WHO for DC

Elements of IHC (HL7-CDA Proposal)

Element name	Data type	OID
Antibody	Coded / String	2.16.840.1.113883.6.1 / ???
Name	String	1.2.276.0.76.5.???
Manufacturer	String	1.2.276.0.76.5.???
Class of antibody	Coded	1.2.276.0.76.5.???
Protocol-ID	String	1.2.276.0.76.5.???
Length of reaction	Coded	1.2.276.0.76.5.???
Staining pattern	Coded	1.2.276.0.76.5.???
Distribution pattern	Coded	1.2.276.0.76.5.???
Percentage positive cells	INT / Coded	1.2.276.0.76.5.???
Issue type	Coded	1.2.276.0.76.5.???
Staining result	Coded	1.2.276.0.76.5.???
Preprocessing	Coded	1.2.276.0.76.5.???
Image analysis	String	1.2.276.0.76.5.???
Reference type	Coded	1.2.276.0.76.5.???

Value sets for IHC (HL7-CDA Proposal)

Antibody	Meaning	Code
Actin (smooth muscle)	Reacts with smooth muscle actin	40563-9
AmyloidA	Reacts with Amyloid, Type AA	10463-8
CD15	Reacts with LCA	???
Antibody Name	Meaning	
CD4	Monoclonal mouse-AB against smooth muscle actin	
CD11	Monoclonal mouse-AB against amyloid, type AA	
CD11	Monoclonal mouse-AB against LCA	
CD7/26	Monoclonal mouse-AB against LCA	

Value sets for IHC (HL7-CDA Proposal)

Class of antibody	Meaning	Code
Class I	Antibody for diagnostic IHC, interpreted in context with morphology and clinical data, for cell differentiation	1
Class II	Antibody for diagnostic IHC with direct relevance for therapy	2
	Antibody with CE stamp, validated by vendor	3
Staining intensity	Meaning	Code
None	No staining	0
Weak	Weak staining (compared with positive control)	1
Moderate	Moderate staining (compared with positive control)	2
Strong	Strong staining (compared with positive control)	3

Value sets for IHC (HL7-CDA Proposal)

Staining pattern	Meaning	Code
No staining	No reaction	0
Nuclear	Nuclei stained	1
Cytoplasmic	Cytoplasm stained	2
Membrane_complete	Cytoplasmic membrane completely stained	3
Membrane_incomplete	Cytoplasmic membrane incompletely stained	4
Combined	More than one cellular structure stained	5

Distribution pattern	Meaning	Code
No staining	No objects stained	0
Diffuse	Homogeneous distribution of stained objects	1
Focal	focal distribution of stained objects	2
Basal	Stained objects in basal layers of structure	3
Luminal	Stained objects in luminal layers of	4

ELEMENTS OF TNM (HL7)

HL7-CDA Implementation guide 1.2.276.0.76.7.4, V 1.1

Element	Code name	Class / Path	Representation
	Grading (ICD-O, 2nd digit)	Observation (ICD-O)	qualifier.@name
	Dignity (ICD-O, 1st digit)	Observation (ICD-O)	qualifier.@name
	T category	support-Observation	Observation/value.@code
	N category	support-Observation	Observation/value.@code
	M category	support-Observation	Observation/value.@code
	Multiplicity	support-Observation (T)- support-Observation	Observation/value.@code
	Certainty factor	support-Observation (T or N or M)-support- Observation	Observation/value.@code
	Residual tumor	support-Observation	Observation/value.@code
	Grading	support-Observation	Observation/value.@code
	Lymphovascular invasion	support-Observation	Observation/value.@code
	Venous invasion	support-Observation	Observation/value.@code
	Staging	support-Observation	Observation/value.@code

Conclusions

terminology is structure driven

terminology differences among different sources to overcome

increased attention to basic observable entities, avoiding too much precoordination

mapping is one solution, ontological approach better?

toolbox for terminology building essential

more feedback to national terminology development