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miracum

Medical Informatics for Research and Care in University Medicine

Wozu SNOMED CT zur Datenintegration in MIRACUM?

13. 3.2018

SNOMED CT – Universelle Medizinsprache?

SNOMED CT The Global Language of Healthcare

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SNOMED CT model
component

2

Filter results by Refset

CTV3 simple map

1272

ICD-O simple map
reference set

133

Anatomy structure and
entire association reference
set

89

Anatomy structure and
part association reference set

2

Pancreatic divisum	Pancreas divisum (disorder)
Pancreatic abscess	Abscess of pancreas (disorder)
Mumps pancreatitis	Mumps pancreatitis (disorder)
Pancreatic symptom	Pancreatic symptom (finding)
Pancreatic fistula	Pancreatic fistula (disorder)
Pancreatic atrophy	Atrophy of pancreas (disorder)
Pancreatic cholera	Verner-Morrison syndrome (disorder)
Pancreatin allergy	Pancreatin allergy (disorder)
Pancreatic peptide	Pancreatic peptide (substance)
Pancreatic hormone	Pancreatic hormone (substance)
Pancreatic surgeon	Pancreatic surgeon (occupation)
Pancreatic ascites	Pancreatic ascites (disorder)
Pancreatin capsule	Pancreatin capsule (product)
Pancreatic amylase	Pancreatic amylase (substance)
Pancreatic hormone	Pancreatic hormone (disposition)
Acute pancreatitis	Acute pancreatitis (disorder)
Pancreatic function	Pancreatic function (observable entity)
Groove pancreatitis	Groove pancreatitis (disorder)

Summary

Details

Diagram

Expression

Refsets

Members

References

Stated

Inferred

Parents

- Gastrointestinal tract anastomosis - intestine (procedure)
- Repair of pancreas (procedure)

Pancreas to intestine anastomosis (procedure)

SCTID: 43907003

43907003 | Pancreas to intestine anastomosis (procedure) |

Pancreas to intestine anastomosis
Pancreaticenterostomy
Drainage of pancreas by anastomosis
Enteropancreatostomy
Pancreas to intestine anastomosis (procedure)

Method → Anastomosis - action
Procedure site - Direct → Pancreatic structure

Method → Anastomosis - action
Procedure site - Direct → Intestinal structure

Children (6)

- Distal subtotal pancreatectomy with pancreaticojejunostomy (procedure)
- Ileopancreatostomy (procedure)
- Pancreaticocystoenterostomy (procedure)
- Pancreaticoduodenostomy (procedure)
- Pancreaticojejunostomy (procedure)
- Pancreaticojejunostomy, side-to-side anastomosis (procedure)

SNOMED CT – "Steckbrief"

- Terminologie für die elektronische Krankenakte
- Internationaler Standard (SNOMED international), in über 50 Ländern eingesetzt
- Ca. 300.000 "Konzepte"(disorders, findings, procedures, observables, organisms, products, substances, qualities, ...)
- Formale Definitionen
- Pro Konzept ein oder mehr Terme pro Sprache (bisher nicht Deutsch)
- Erweiterbar (Refsets, Postkoordination)
- Schnittstellen zu anderen Standards (LOINC, HL7, IDMP, WHO-Klassifikationen)

Technical Implementation Guide

Technical Implementation Guide

Current Version - Under Revision



The Technical Implementation Guide (TIG) provides an entry point to a range of guides on more specific topics.

Note: This is a change from earlier releases of this guide and formerly the TIG contained all the other guides. This change has been made to streamline future maintenance and updating of the individual guides.

- [Release File Specification](#)
- [Expressions - Compositional Grammar Specification](#)
- [Expression Constraint Specification](#)
- [URI Standard](#)
- [Diagramming Guideline](#)
- [Terminology Services Guide](#)
- [Search and Data Entry Guide](#)
- [Record Services Guide](#)
- [Editorial Guide](#)
- [Machine Readable Concept Model](#)
- [Extensions Guide](#)
- [Change Management Guide](#)

<http://snomed.org/tig>

SNOMED CT Browser

Search

Options

Search Mode: Partial matching search mode ▾

Status: Active components only ▾

☐ Group by concept

Filter results by Language

english 2

Filter results by Semantic Tag

procedure 2

Filter results by Module

SNOMED CT core 2

Type at least 3 characters ✓ Example: *shou fra*

Pan int ana

2 matches found in 0.192 seconds.

☰ Pancreas to intestine anastomosis	Pancreas to intestine anastomosis (procedure)
☰ Pancreas to intestine anastomosis (procedure)	Pancreas to intestine anastomosis (procedure)

All 2 results are displayed

<http://browser.ihtsdotools.org>

Hierarchischer Kontext

Parents

- ≡ Gastrointestinal tract anastomosis - intestine (procedure)
- ≡ Repair of pancreas (procedure)

≡ Pancreas to intestine anastomosis (procedure) ☆ ↗

SCTID: 43907003

43907003 | Pancreas to intestine anastomosis (procedure) |

Pancreas to intestine anastomosis
Pancreaticoenterostomy
Drainage of pancreas by anastomosis
Enteropancreatostomy
Pancreas to intestine anastomosis (procedure)

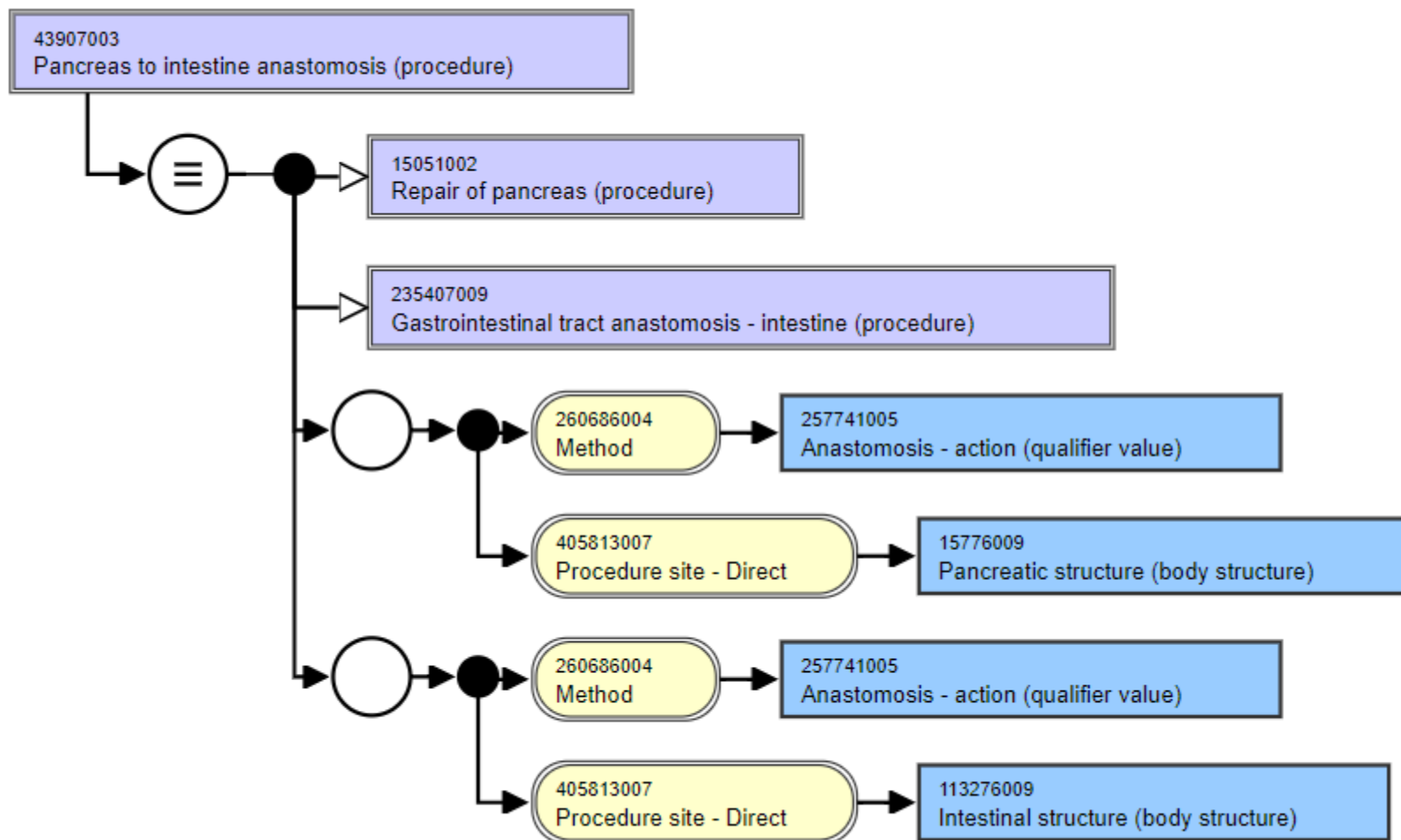
Method → Anastomosis - action
Procedure site - Direct → Pancreatic structure

Method → Anastomosis - action
Procedure site - Direct → Intestinal structure

Children (6)

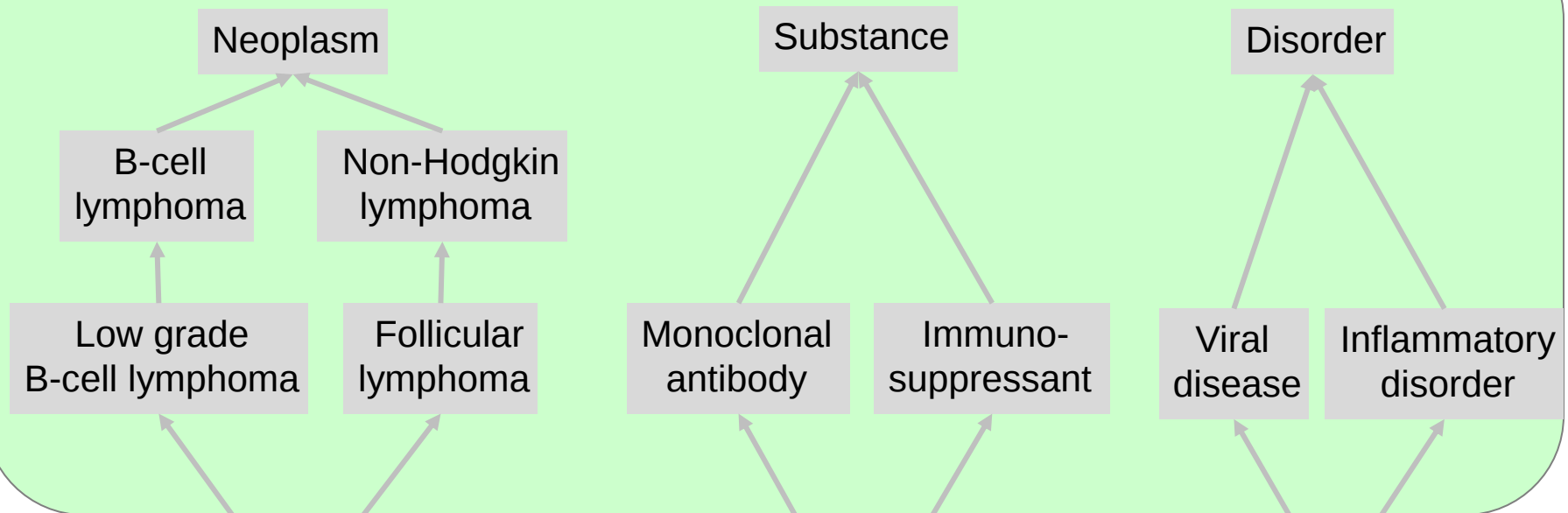
- ≡ Distal subtotal pancreatectomy with pancreaticojejunostomy (procedure)
- ≡ Ileopancreatostomy (procedure)
- ≡ Pancreaticocystoenterostomy (procedure)
- ≡ Pancreaticoduodenostomy (procedure)
- ≡ Pancreaticojejunostomy (procedure)
- ≡ Pancreaticojejunostomy, side-to-side anastomosis (procedure)

Graphische Darstellung



SNOMED CT – Polyhierarchien

Aggregierte Konzepte für Recherche



Follicular low grade
B-cell lymphoma

Rituximab

Herpes zoster
dermatitis

Detaillierte Kodierung von Patientendaten

SNOMED CT – Koordination

Präkoordination

"Verbrennung 2. Grades eines einzelnen Fingers"

```
211908006 |Deep partial thickness burn of a single finger (disorder)|
```

≡

```
<<< 29673001 |Second degree burn of single finger, not thumb (disorder)| :  
{ 116676008 |Associated morphology| = 262588000 |Deep partial thickness burn  
(morphologic abnormality)|, 363698007 |Finding site| = 56213003 |Skin of  
finger (body structure)| }
```

Postkoordination

"Verbrennung 2. Grades der Rückseite des rechten Zeigefingers"

```
<<< 29673001 |Second degree burn of single finger, not thumb (disorder)| :  
{ 116676008 |Associated morphology| = 262588000 |Deep partial thickness burn  
(morphologic abnormality)|, 363698007 |Finding site| = 37314006 | Skin  
structure of dorsal surface of index finger (body structure) |, 272741003  
|Laterality| = 24028007 |Right (qualifier value)| }
```

SNOMED CT in MIRACUM

- Mögliche Verwendungsszenarien
 - SNOMED CT - Codes als Referenz für Wertelisten (value sets) für strukturierte Dateneingabe.
 - SNOMED CT zu manuellen Annotation von Textdokumenten
 - SNOMED CT als Vokabular für NLP-basierte Analyse von Texten
- Was ergänzt werden muss:
 - deutsche Interface-Terminologie

Unterschied Terminologie-Labels Interface-Terme

Termhäufigkeiten in Kardiologie-Arztbriefen (Med. Univ. Graz)

Vorzugsterm (ICD, OPS)	n	Interfaceterm	n
Aortenklappenstenose	3749	Aortenstenose	3126
Hirninfarkt	7	Schlaganfall	65
Elektrokardiogramm	0	EKG	12208
Koronare Herzerkrankung	331	KHK	18455
Nicht-ST-Hebungsinfarkt	498	NSTEMI	3839
Magnetresonanztomographie	2	NMR	17

Interfaceterminologie



Pancreas to intestine anastomosis (procedure)



SCTID: 43907003

Pankreatikoenterostomie

Pankreatikoileostomie

Enteropankreatostomie

Ileoenterostomie

Drainage des Pankreas durch Anastomose

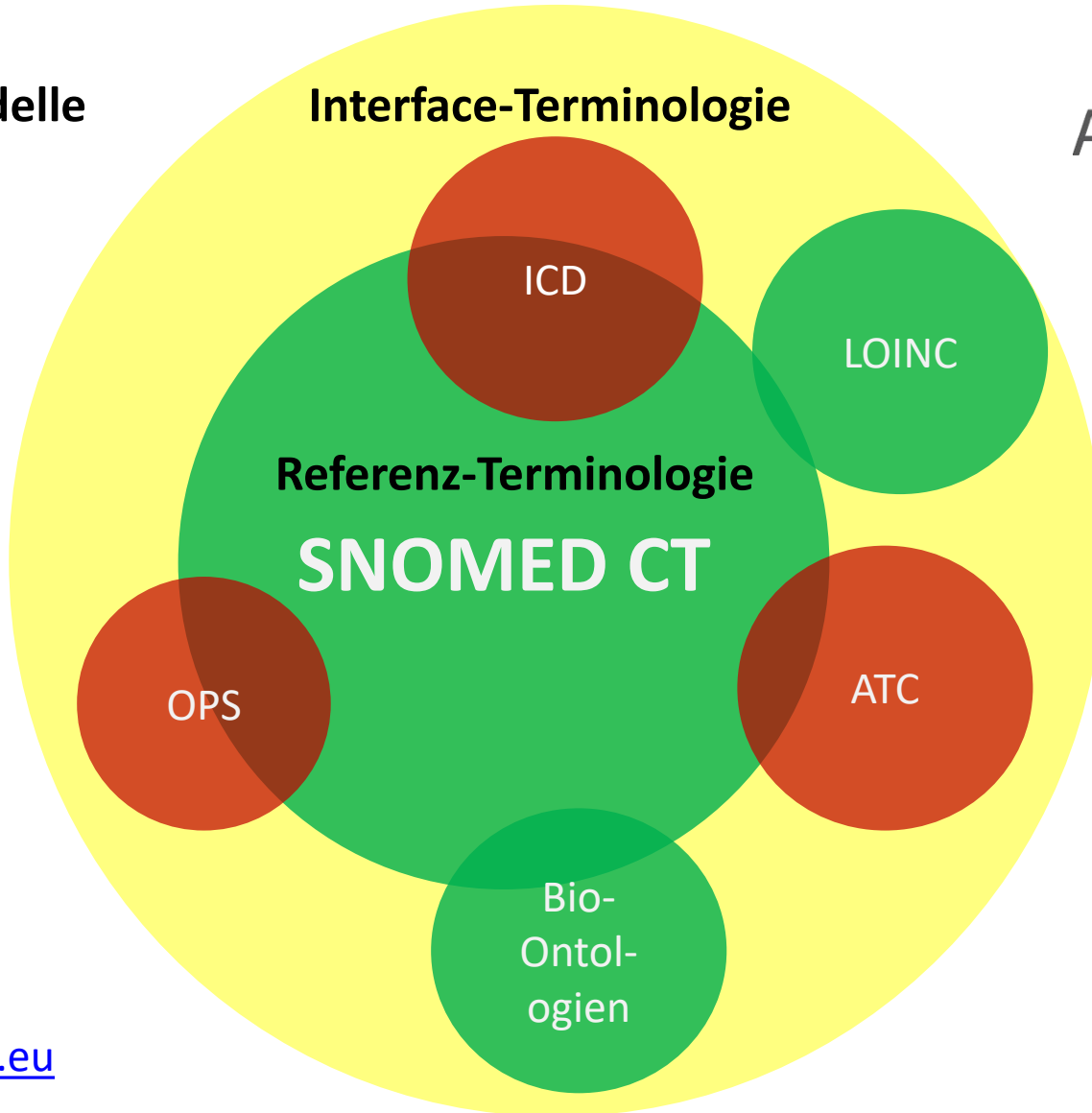
Anastomosierung des Pankreas mit dem Dünndarm

SNOMED CT im Kontext

Informationsmodelle

Interface-Terminologie

HL7
(CDA, FIHR)
openEHR
EN13606



SNOMED CT – Nächste Schritte für MIRACUM

- Erwerb eine SNOMED CT - Lizenz
 - Forschungslizenz
 - Vollmitgliedschaft SNOMED International anzustreben
- Erstellung einer Interface-Terminologie
 - Idealerweise: gemeinsam mit anderen Partnern
 - Bottom – up, durch Use cases getriggert
 - Crowdsourcing plattform
- SNOMED CT Interface-Vokabular der Medizinischen Universität Graz kann getestet werden (ca. 2 Mio Terme aus 100k n-Gramm - Übersetzungen)

MUG-GIT (Medical University of Graz – German Interface Vocabulary for SNOMED CT)

- Motivation: semantic EHR extracts for biomarker research (CBmed IICCAB*)
- Approach
 - Split of SNOMED CT terms into word n-grams
 - Manual editing of derived core vocabulary
 - Priority: term frequency and use cases
 - German terms from clinical corpora and terminologies
- Current state
 - Approx. 2 Million machine-generated interface terms, out of 95,000 n-gram translations
 - Core vocabulary maintained by medical students, guideline-driven (e.g. inclusion of word stems, spelling rules, acronyms only in context)

Word ngram – core vocabulary

vaginal	1	1478	vaginales JJ	Scheiden-	
fluoroscopic guidance	2	1477	Durchleuchtungskontrolle NN F		
disc	1	1476	Scheibe NN F		
lower limb	2	1473	unteres JJ Extremität NN F	Bein NN N	
brain	1	1468	Gehirn NN N	Hirn NN N	Encephalon NN N
preparation	1	1464	Zubereitung NN F	Aufbereitung NN F	Präparation NN F
method	1	1463	Verfahren NN N	Methode NN F	
of bone	2	1462	des Knochens	_Knochen_	
Red	1	1455	rotes JJ		
Monitoring	1	1453	Überwachung NN F	Monitoring NN N	
Computed	1	1453	berechnetes JJ	Computer-	
phalanx	1	1449	Phalanx NN F		
subsp.	1	1449			
anastomosis	1	1447	Anastomose NN F	Anastomosierung NN F	
vessel	1	1446	Blutgefäß NN N	Gefäß NN N	
Computed tomography	2	1443	Computertomographie NN F		
uterus	1	1436	Uterus NN M	Gebärmutter NN F	
difficulty	1	1432	Schwierigkeit NN F		
elbow	1	1429	Ellbogen NN M	Cubitus NN M	Ellbogengelenk NN N
high	1	1429	hohes JJ		
food	1	1423	Lebensmittel NN N	Speise NN F	Nahrungsmittel NN N
Observation	1	1423	Beobachtung NN F		
using fluoroscopic	2	1422			
unable	1	1421	unfähiges JJ		
Peripheral	1	1419	peripheres JJ		
unable to	2	1418	unfähig zu		
Vascular	1	1417	vasculäres JJ	Gefäß-	
using fluoroscopic guidance	3	1416	mit Durchleuchtungskontrolle		
Benign neoplasm	2	1415	gutartiges JJ Neubildung NN F	gutartiges JJ Neoplasie NN F	benignes JJ Neoplasie NN F

Machine-generated Interface terms

20170315_240011_002	126952004	Neoplasm of brain	Gehirnneubildung
20170315_240011_003	126952004	Neoplasm of brain	Neubildung des Hirns
20170315_240011_004	126952004	Neoplasm of brain	Hirnneubildung
20170315_240011_005	126952004	Neoplasm of brain	Neoplasie des Gehirns
20170315_240011_006	126952004	Neoplasm of brain	Gehirnneoplasie
20170315_240011_007	126952004	Neoplasm of brain	Neoplasie des Hirns
20170315_240011_008	126952004	Neoplasm of brain	Hirnneoplasie
20170315_240011_009	126952004	Neoplasm of brain	Neoplasma des Gehirns
20170315_240011_010	126952004	Neoplasm of brain	Gehirnneoplasma
20170315_240011_011	126952004	Neoplasm of brain	Neoplasma des Hirns
20170315_240011_012	126952004	Neoplasm of brain	Hirnneoplasma
20170315_241010_001	126953009	Neoplasm of cerebrum	Neubildung des Großhirns
20170315_241010_002	126953009	Neoplasm of cerebrum	Neoplasie des Großhirns
20170315_241010_003	126953009	Neoplasm of cerebrum	Neoplasma des Großhirns
20170315_242015_001	126954003	Neoplasm of frontal lobe	Neubildung des Frontallappens
20170315_242015_002	126954003	Neoplasm of frontal lobe	Neubildung des Lobus frontalis
20170315_242015_003	126954003	Neoplasm of frontal lobe	Neoplasie des Frontallappens
20170315_242015_004	126954003	Neoplasm of frontal lobe	Neoplasie des Lobus frontalis
20170315_242015_005	126954003	Neoplasm of frontal lobe	Neoplasma des Frontallappens
20170315_242015_006	126954003	Neoplasm of frontal lobe	Neoplasma des Lobus frontalis
20170315_243013_001	126955002	Neoplasm of temporal lobe	Neubildung des Temporallappens
20170315_243013_002	126955002	Neoplasm of temporal lobe	Neubildung des Lobus temporalis
20170315_243013_003	126955002	Neoplasm of temporal lobe	Neoplasie des Temporallappens
20170315_243013_004	126955002	Neoplasm of temporal lobe	Neoplasie des Lobus temporalis
20170315_243013_005	126955002	Neoplasm of temporal lobe	Neoplasma des Temporallappens

Alternativen zu SNOMED - CT

- Mix deutscher Terminologien (ICD, OPS, ATC, AbdaMed)
 - limitierte internationale Kompatibilität
 - inhaltliche Lücken
 - unterschiedliche Granularität
 - Klassifikationen nicht ideal für semantische Annotation und Retrieval
- UMLS (ohne SNOMED CT)
 - Hybrid stark heterogener Terminologiesysteme
 - kein einheitliches System
 - Unzureichende Abdeckung der deutschen Sprache

Take-home messages für MIRACUM

- MI-I als Katalysator für SNOMED CT- Einführung
- Vorteile SNOMED CT: Umfang, Granularität, Erweiterbarkeit, Schnittstellen zu anderen semantischen Standards
- SNOMED-Einführung: gemeinsame Aufgabe aller MI-I-Projekte, gemeinsam mit Partnern in Österreich und der Schweiz
- Primäre Aufgabe: gemeinsame Erstellung und Verwendung einer auf SNOMED –CT – abgebildeten Interfaceterminologie