

# German-Language Content in Biomedical Vocabularies

**Stefan Schulz<sup>a,e</sup>, Josef Ingenerf<sup>b</sup>, Sylvia Thun<sup>c</sup>, Philipp Daumke<sup>d</sup>, Martin Boeker<sup>e</sup>**

<sup>a</sup>Institute for Medical Informatics, Statistics and Documentation,  
Medical University of Graz, Austria

<sup>b</sup>Institute for Medical Informatics, University of Lübeck, Germany

<sup>c</sup>University of Niederrhein, Krefeld, Germany

<sup>d</sup>Averbis GmbH, Freiburg, Germany

<sup>e</sup>Institute of Medical Biometry and Medical Informatics, University of Freiburg, Germany

# Biomedical Vocabulary

## ■ Umbrella term for

- Classification, Nomenclature, Terminology, Ontology, Catalogue

## ■ Building blocks

- **Representational units:** the primary identifiers of meaning (RUs, **concepts**, classes, synsets)
- **Links:** the connections between RUs, such as broader/narrower, is-a, part-of
- **Codes:** alphanumeric identifiers for a concept
- **Terms:** words or group of words that describe the meaning of a RU in human language.
- **Hierarchies:** network of links that constitute a partial order (single or multiple hierarchies)
- **Axes:** systems of independent, non-overlapping hierarchies
- **Glossary entries** (scope notes): natural language elucidations of concept meaning and use
- **Axioms:** sentences expressed in logic providing formal, computable definitions for concepts
- **Rules:** directives that specify exclusion and inclusion criteria in classifications

# Genres of Biomedical Vocabularies

- Thesauri: describe the meanings of pre-existing terms and relate them using semantic relations

- synonymy / broader...narrower

[MeSH]  
Blood  
- Blood plasma  
- Fetal blood

- Classifications:

- Subclass hierarchies
- tendency to artificial names
- arbitrarily restricted meanings due to class disjointness

"In-vitro-Bestimmung des  
Genexpressionsprofils mittels RNA  
aus Monozyten des peripheren Blutes  
bei Zustand nach Transplantation"

E10: Insulin-dependent diabetes mellitus  
Excl. complications of pregnancy, childbirth  
and the puerperium (O00-O99)

- Ontologies

- logic-based foundation
- concepts represent types of entities rather than meaning of words

SCT: Cholecystitis subClassOf  
Associated morphology some Inflammation and  
Finding site some Gallbladder structure

# Survey

- ICD-10
- OPS
- ICD-O
- MeSH
- MEDDRA
- LOINC
- ATC
- ICF
- SNOMED /Wingert Nomenclature
- RADLEX
- EDQM
- UCUM
- ICPC
- ICNP

- 
- Fee catalogues for procedure-based reimbursement
  - Sources for Latin terms
  - Domain-independent terminology sources

# ICD 10

## ■ Two German versions:

- Mortality (WHO): 14,400 RUs
- Morbidity (DIMDI): ICD-10 GM (12,500 concepts) extensions, pruning of subhierarchies

## ■ Alphabetical Index: 77,000 terms linked to ICD-10 GM identified by Alpha ID

- Synonyms
- more specific entry terms, e.g.

"Amoxicillin-Allergie" [I112547] → T88.7

(Unspecified adverse effect of drug or medicament).

- Arm  
-- beim Fetus P03.1  
-- Fetus, Betreuung, Mutter O32.2  
-- Hindernis, Geburt O64.4  
-- Komplikation, Entbindung O32.2  
-- mit Schnittentbindung O32.2  
- Bandscheibe M51.2  
-- lumbal M51.2  
-- lumbosakral M51.2  
-- mit  
--- Ischialgie M51.1† G55.1□  
--- Kompression, Rückenmark a.n.k. M51.0† G99.2  
--- Lendenwirbelsäulensyndrom M51.1† G55.1  
--- Neuritis M51.1† G55.1□  
--- Zervikalsyndrom M50.1† G55.1□  
-- thorakal M51.2  
-- zervikal M50.2  
--- mit  
---- Kompression, Rückenmark M50.0† G99.2  
---- Myelopathie M50.0† G99.2

# OPS

- Procedure coding system, only used in Germany and Austria
- Adaptation of the WHO's International Classification of Procedures in Medicine (ICPM)
- 28,300 concepts
- Alphabetical index
- Watch out:  
Abbreviated class labels

1-497	<b>Transvenöse oder transarterielle Biopsie</b>
1-497.0	Endokard
1-497.1	Endomyokard
1-497.2	Myokard
1-497.3	Leber
1-497.x	Sonstige
1-497.y	N.n.bez.

# MeSH

- Indexing vocabulary for biomedical literature (not recommended for EHR)
- 28,300 concepts (main headings )
- German version: and 60,067 German entry terms (compared to 193,000 English entry terms)
- No translation of scope notes
- Annual update (DIMDI)

MeSH Heading	Hip Fractures
Tree Number	<a href="#">C26.404.061.425</a>
Tree Number	<a href="#">C26.404.484</a>
Tree Number	<a href="#">C26.531.750</a>
Tree Number	<a href="#">C26.558.276.425</a>
Annotation	GEN or unspecified; note X refs: fract below subtrochant = <a href="#">FEMORAL FRACTURES</a> ; <a href="#">FEMORAL NECK FRACTURES</a> is available; femur head fract = <a href="#">FEMUR HEAD / inj</a> (IM) + <a href="#">HIP FRACTURES</a> (IM); acetabular fract = <a href="#">ACETABULUM / inj</a> (IM) + <a href="#">FRACTURES, BONE</a> (IM)
Scope Note	Fractures of the <a href="#">FEMUR HEAD</a> ; the <a href="#">FEMUR NECK</a> ; ( <a href="#">FEMORAL NECK FRACTURES</a> ); the trochanters; or the inter- or subtrochanteric region. Excludes fractures of the acetabulum and fractures of the femoral shaft below the subtrochanteric region ( <a href="#">FEMORAL FRACTURES</a> ).
Entry Term	Intertrochanteric Fractures
Entry Term	Subtrochanteric Fractures
Entry Term	Trochanteric Fractures

# SNOMED CT

- emerging international standard, maintained by the IHTSDO (International Health Terminology Standards Development Organisation), approx. 311,000 concepts, ontology based, biannual update
- German speaking countries so far no IHTSDO members
- Non-released German translation from 2004 (362,000 concepts, ~1M terms)

## Parent(s):

(Select a parent to make it the "Current Concept".)

[Disorder of hip joint \(disorder\)](#)

[Fracture of femur \(disorder\)](#)

[Injury of hip region \(disorder\)](#)

[Joint injury \(disorder\)](#)

## Current Concept:

[Fracture of proximal end of femur \(disorder\)](#)

## Child(ren):

(N=9) (Select a child to make it the "Current Concept".)

[Closed fracture of hip \(disorder\)](#)

[Fracture of neck of femur \(disorder\)](#)

[Fracture of trochanter of femur \(disorder\)](#)

[Intertrochanteric fracture \(disorder\)](#)

[Non-traumatic acute slipped upper femoral epiphysis \(disorder\)](#)

[Non-traumatic acute-on-chronic slipped upper femoral epiphysis \(disorder\)](#)

[Non-traumatic chronic slipped upper femoral epiphysis \(disorder\)](#)

[Open fracture of hip \(disorder\)](#)

[Subtrochanteric fracture of femur \(disorder\)](#)

## Current Concept:

**Fully Specified Name:** Fracture of proximal end of femur (disorder)

**ConceptId:** 263225007

**Source:** Core

## Defining Relationships:

**Is a** Disorder of hip joint (disorder)

**Is a** Fracture of femur (disorder)

**Is a** Injury of hip region (disorder)

**Is a** Joint injury (disorder)

Group 1

**Associated morphology (attribute)** [Fracture \(morphologic abnormality\)](#)

**Finding site (attribute)** [Bone structure of proximal femur \(body structure\)](#)

*This concept is sufficiently defined.*

## Descriptions (Synonyms):

**Fully Specified Name:** Fracture of proximal end of femur (disorder)

**Synonym:** Hip fracture [ 391384012]

**Synonym:** Fracture of proximal end of femur [ 391383018]

## US English:

**Preferred:** Fracture of proximal end of femur [ 391383018]

**Acceptable:** Hip fracture [ 391384012]

## GB English:

**Preferred:** Fracture of proximal end of femur [ 391383018]

**Acceptable:** Hip fracture [ 391384012]



# Wingert nomenclature

- Origin: SNOMED v2
- multiaxial nomenclature
- German translation (1984)  
available as  
"Wingert nomenclature",  
maintained by private  
SW company

D5-46210	Acute appendicitis, NOS
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D5-46100	Appendicitis, NOS
G-A231	Acute

M-41000	Acute inflammation, NOS
G-C006	In
T-59200	Appendix, NOS

G-A231	Acute
M-40000	Inflammation
G-C006	In
T-59200	Appendix, NOS

# RadLex

- Vocabulary of standardized radiological terms for structured reporting in medical imaging
- 30,000 concepts
- 6,240 German translations



# MedDRA

- Terminology for the drug regulatory process
- signs, symptoms, diseases, procedures, investigation results and therapeutic indications
- German translation: 92,000 German terms
- different kinds of synonymy relations

# ICNP - International Classification of Nursing Practice

- Vocabulary for nursing diagnoses, interventions, and results
- 2800 concepts
- Multiaxial terminology system, increasingly ontology and logic-based.
- German version is maintained by the German ICNP User Group

ICNP - **Pflegephänomen** (--)  
*Definition:* Pflegephänomen ist eine Art eines Faktors, der den Gesundheitszustand beeinflusst, mit den spezifischen Merkmalen, die den sp  
Aspekt der Gesundheit.

 **Zeit** (Opt)  
*Definition:* Punkt, Periode, Umstand, Intervall der Dauer eines Auftretens (z.B.: Aufnahme, Geburt, ...)

**T - Zeit** (Opt)  
*Definition:* Der Zeitpunkt, die Periode, der Anlass, das Intervall oder die Dauer eines Ereignisses

10008234 - **Häufigkeit** (Opt)  
*Definition:* Zeit mit spezifischen Merkmalen: Anzahl des Auftretens in einer bestimmten Zeitper  
Zeiteinheit.

10002192 - **Immer** (Opt)  
*Definition:* Häufigkeit

10013173 - **Niemals** (--)  
*Definition:* Ein Pflegephänomen, welches niemals auftritt, ist ein Unterbrochenes Pflegephänomen, bei dem die Rate der Wiederholungen während eines Zeitintervalls ist 0.

10013173 - **Niemals** (Opt)

## Special cases

- Catalogues for reimbursement, drugs, devices
- Sources for Latin terms
- Domain-independent terminology sources

# Catalogues

- Fee schemes for the ambulatory sector
- Terms + defined descriptions, exclusions inclusions
- Similar for devices (eClass) and drugs (ABDA)

34291 Herzkatheteruntersuchung mit Koronarangiographie

Obligater Leistungsinhalt

- Herzkatheteruntersuchung mit Koronarangiographie,
- Begleitleistungen, die im unmittelbaren Zusammenhang mit der Leistungserbringung stehen,
- Kontrastmitteleinbringung(en),

Fakultativer Leistungsinhalt

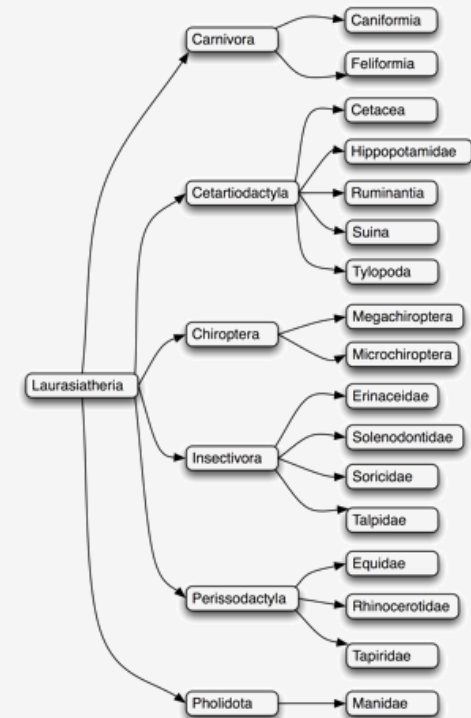
- Selektive Darstellung auch bei Patienten mit einem oder mehreren Bypassen und/oder bei Patienten mit Herzvitium,
- Angiokardiographie (Nr. 34290),
- Gerinnungsuntersuchung(en) (z. B. aktivierte Gerinnungszeit),

einmal im Behandlungsfall 8865 Punkte

# Sources for Latin terms

- Use of Latin terms (with Latin inflections) in German text
  - Organisms ("Homo sapiens", "Drosophila melanogaster")
  - Anatomy ("Vena cava superior", "Papilla Vateri")
- International sources:
  - NCBI taxonomy for organisms
  - Terminologia Anatomica (Latin and English)

A02.0.00.004	Substantia spongiosa; Substantia trabecularis	Spongy bone; Trabecular bone
A02.0.00.005	Pars cartilaginea	Cartilaginous part
A02.0.00.006	Pars membranacea	Membranous part
A02.0.00.007	Periosteum	Periosteum
A02.0.00.008	Perichondrium	Perichondrium
A02.0.00.009	Skeleton axiale	Axial skeleton
A02.0.00.010	Skeleton appendiculare	Appendicular skeleton
A02.0.00.011	Os longum	Long bone
A02.0.00.012	Os breve	Short bone
A02.0.00.013	Os planum	Flat bone
A02.0.00.014	Os irregulare	Irregular bone
A02.0.00.015	Os pneumaticum	Pneumatized bone
A02.0.00.016	Os sesamoideum	Sesamoid bone
A02.0.00.017	Diaphysis	Diaphysis
A02.0.00.018	Epiphysis	Epiphysis



# Lexical German resources

- GermaNet
  - Lexico-semantic network, similar to WordNet under construction
  - 85,000 concepts (synsets), 111,000 terms, 100,000 linkages
- Coverage not domain specific, but potential source for layperson terms
- Rubrics in medical lexicons
  - Pschyrembel
  - Roche Lexicon
- Wikipedia

## Bäckerkaries

([Karies](#)) f: (engl.) baker's caries; syn. [Zuckerbäckerkaries](#);

### Definition

Sonderform der [Zahnkaries](#) mit außergewöhnl. Intensität u. rascher Genese bes. an Front- u. Schneidezähnen bei Bäckern u. Konditoren;

### Ursachen

Gärungsprozesse in der Mundhöhle, bei denen durch berufsbedingte Zucker- u. Mehlstaubablagerungen Karies induzierende Milch-, Butter- u. Brenztraubensäure entstehen; Vork. durch bessere Zahnpflege u. entspr. Arbeitsschutzmaßnahmen (Be- u. Entlüftung) nur noch selten.



# General observations

- Localised versions modify the international version (ICD)
- No international version available (OPS)
- Localized version incomplete (RADLEX)
- Localized version outdated (SNOMED CT)
- Localized version unavailable (Wingert, SNOMED CT)
- Localized versions maintained by public body (DIMDI): ICD, MeSH
- Localized versions maintained by user groups (ICPM)
- Additional source of terminology
  - National catalogues (procedures, drugs, devices):
  - Latin Sources
  - Medical and general lexicons

# Machine translation / crowdsourcing

*MEDINFO 2013*

*C.U. Lehmann et al. (Eds.)*

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581

## **Machine vs. Human Translation of SNOMED CT Terms**

**Stefan Schulz<sup>a,c</sup>, Johannes Bernhardt-Melischnig<sup>a</sup>,  
Markus Kreuzthaler<sup>a</sup>, Philipp Daumke<sup>b</sup>, Martin Boeker<sup>c</sup>**

<sup>a</sup>*Institute for Medical Informatics, Statistics and Documentation,  
Medical University of Graz, Austria*

<sup>b</sup>*Averbis GmbH, Freiburg, Germany*

<sup>c</sup>*Institute of Medical Biometry and Medical Informatics,  
University of Freiburg, Germany*

### **Abstract**

*Objective: In the context of past and current SNOMED CT translation projects we compare three kinds of SNOMED CT translations from English to German by: (1) professional*

### **Survey of current translation projects**

Besides the US and UK versions, a complete (Latin American) Spanish translation of SNOMED CT is being maintained