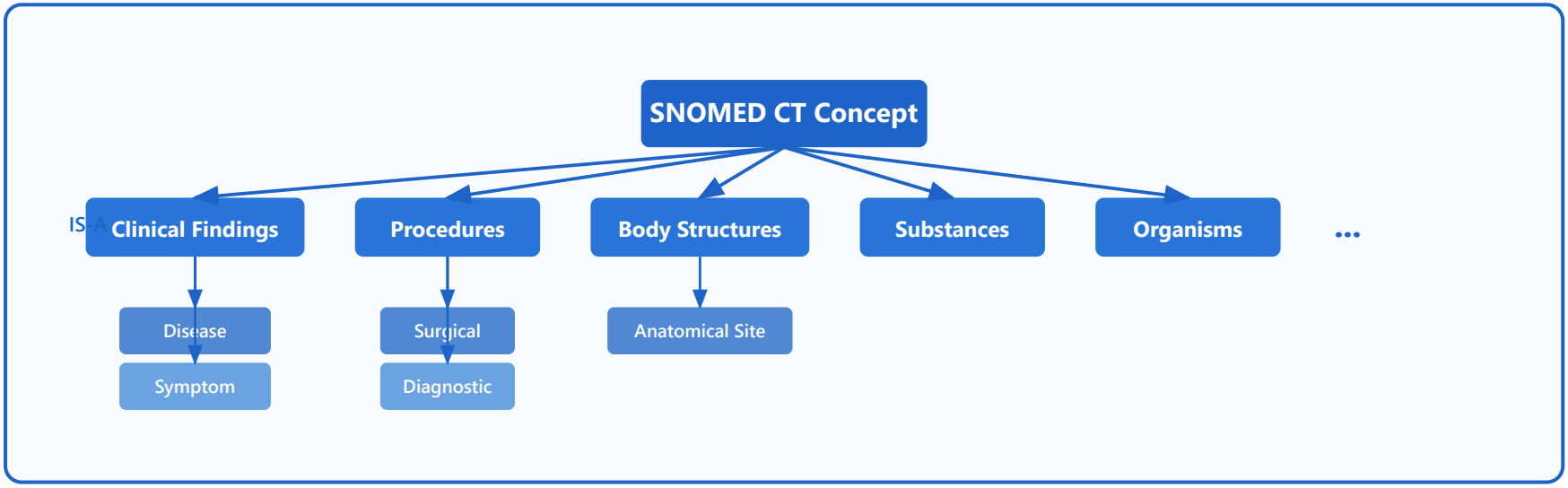
SNOMED CT (Systematized Nomenclature of Medicine - Clinical Terms)



Concept Model

- Concepts, descriptions, relationships
- Unique concept IDs (SCTID)
- Fully specified names
- Synonyms and translations

Hierarchies

- Clinical findings
- Procedures
- Body structures
- Substances
- IS-A relationships

🔗 Relationships

- Finding site
- Associated morphology
- Causative agent
- Procedure site
- Compositional grammar

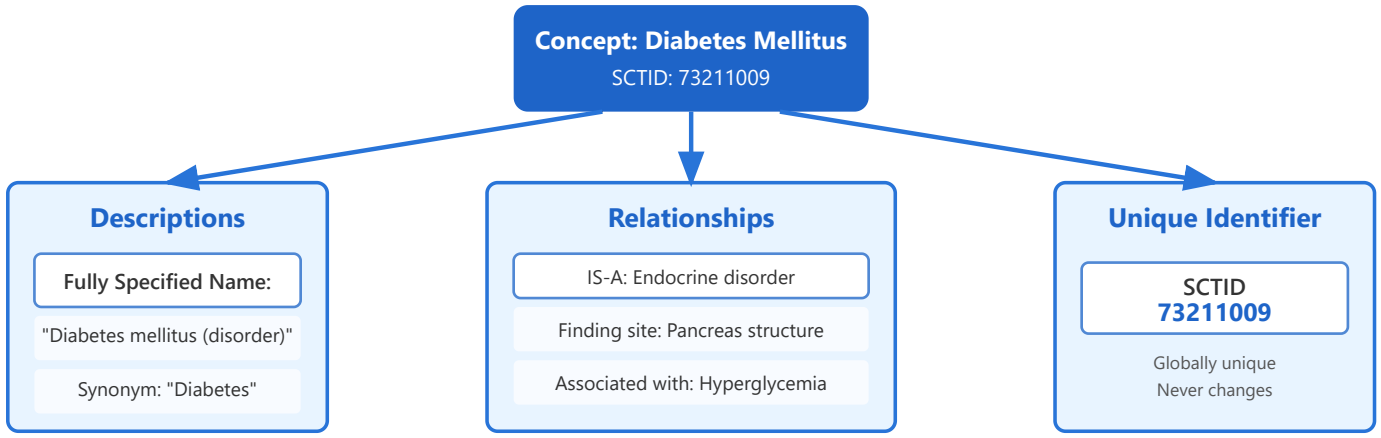
🎯 Post-coordination

- Combine multiple concepts
- Express complex clinical meanings
- Example: 'Fracture of left femur'
- International adoption by 40+ countries

1. Concept Model - The Foundation of SNOMED CT

▶ Understanding the Concept Model

The SNOMED CT Concept Model is the fundamental building block that defines how medical knowledge is structured and represented. Each concept in SNOMED CT represents a unique clinical meaning and is composed of three core components: the concept itself, its descriptions, and its relationships to other concepts.



📋 Real-World Example: Myocardial Infarction

Concept: Myocardial Infarction

SCTID: 22298006

Fully Specified Name: "Myocardial infarction (disorder)"

Synonyms: "Heart attack", "MI", "Cardiac infarction"

Definition: Necrosis of the myocardium caused by an obstruction of the blood supply to the heart muscle

Key Features of the Concept Model:

- ✓ Each concept has a unique, permanent identifier (SCTID) that never changes
- ✓ Multiple descriptions allow for different ways to refer to the same concept
- ✓ Relationships link concepts together to create a rich semantic network

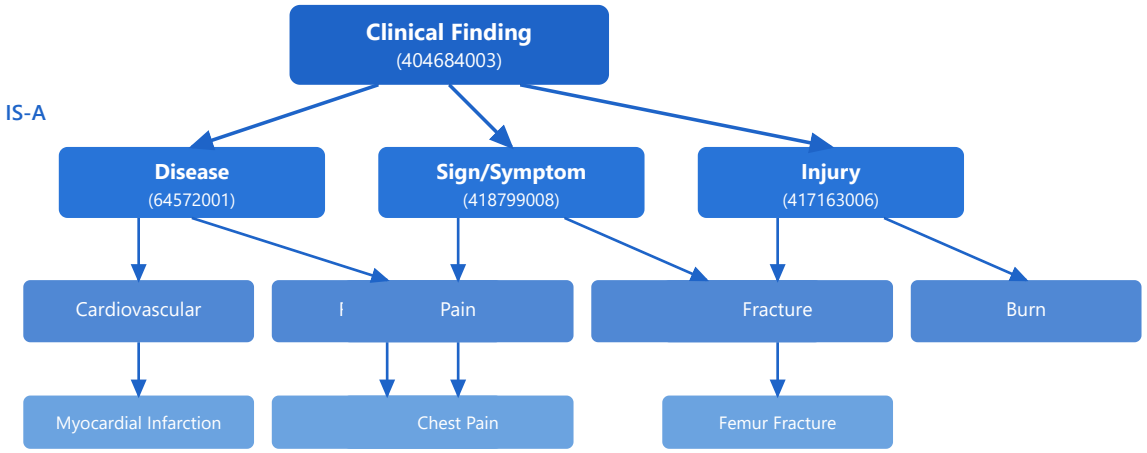
✓ Supports multiple languages and regional variations through translations

2. Hierarchies - Organizing Medical Knowledge

▶ Understanding SNOMED CT Hierarchies

SNOMED CT organizes its concepts into multiple hierarchical structures using IS-A relationships. These hierarchies allow concepts to inherit properties from their parent concepts, creating a logical and consistent classification system. The main top-level hierarchies include Clinical Findings, Procedures, Body Structures, Substances, Organisms, and many others.

Clinical Findings Hierarchy



Procedures Hierarchy Example

📋 Hierarchy Example: Type 2 Diabetes Mellitus

Path through the hierarchy:

SNOMED CT Concept → Clinical Finding → Disease → Endocrine Disorder → Diabetes Mellitus → Type 2 Diabetes Mellitus

Benefits: Type 2 Diabetes inherits all properties from its parent concepts, meaning it is automatically classified as a disease, clinical finding, and endocrine disorder.

Advantages of Hierarchical Organization:

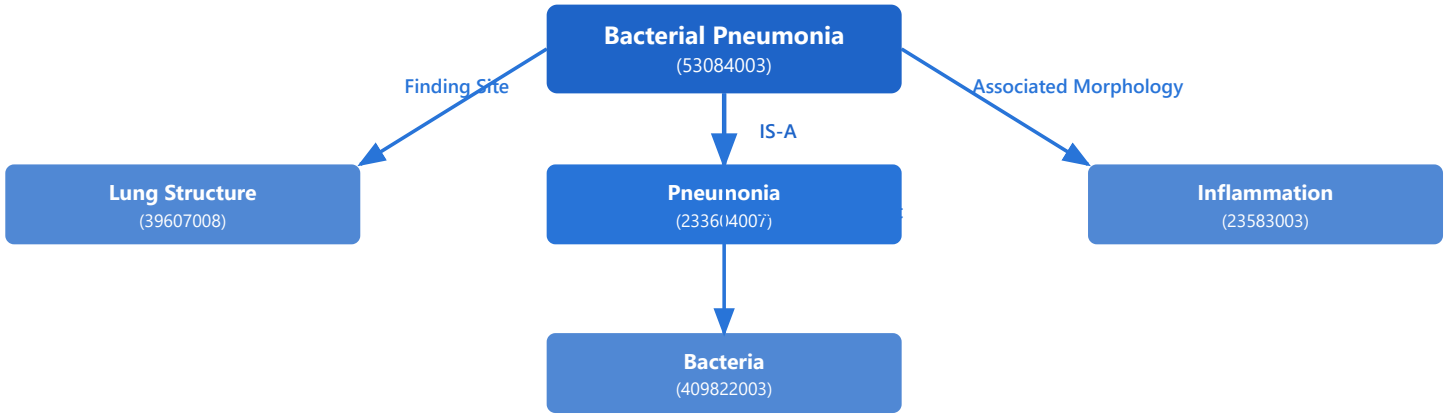
✓ Enables efficient searching and retrieval of related concepts

- ✓ Supports inheritance of properties from parent to child concepts
- ✓ Facilitates data aggregation and statistical analysis at various levels
- ✓ Allows for reasoning and inference about clinical concepts
- ✓ Provides multiple navigation paths through the terminology

3. Relationships - Connecting Medical Concepts

▶ Understanding Relationships in SNOMED CT

Relationships in SNOMED CT go beyond simple hierarchies to create a rich semantic network. These relationships define how concepts relate to each other in clinically meaningful ways, enabling complex queries and inference. Key relationship types include finding site, associated morphology, causative agent, and procedure site, among many others.



Common Relationship Types:

- **Finding Site:** Anatomical location of a clinical finding
- **Associated Morphology:** Structural changes related to a finding
- **Causative Agent:** Organism or substance causing the condition
- **Procedure Site:** Where a procedure is performed
- **Has Active Ingredient:** Active component of a medication
- **Method:** Technique used in performing a procedure

📋 Detailed Relationship Example: Acute Myocardial Infarction

Concept: Acute myocardial infarction (SCTID: 57054005)

Relationships:

- **IS-A** : Myocardial infarction
- **Finding site** : Myocardium structure
- **Associated morphology** : Infarct
- **Clinical course** : Acute onset
- **Has interpretation** : Abnormal

These relationships enable complex queries like "Find all acute cardiac conditions affecting the myocardium"

Benefits of Relationship-Based Modeling:

- ✓ Enables precise definition of clinical concepts through their relationships
- ✓ Supports sophisticated clinical queries across multiple dimensions
- ✓ Facilitates decision support and clinical reasoning systems
- ✓ Allows for automatic classification and inference of concepts
- ✓ Creates a foundation for compositional grammar and post-coordination

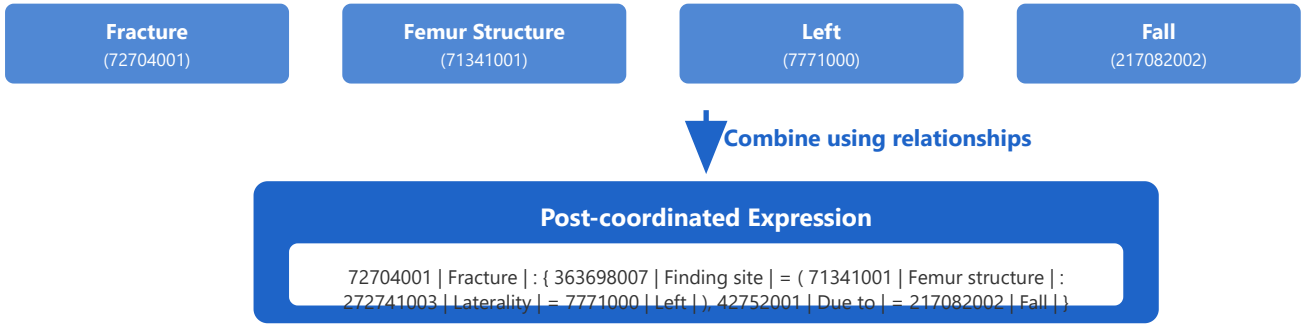
4. Post-coordination - Creating Complex Clinical Expressions

▶ Understanding Post-coordination

Post-coordination is a powerful feature of SNOMED CT that allows users to combine multiple pre-coordinated concepts to express complex clinical situations that may not have a single pre-existing concept. This compositional approach provides the flexibility to represent precise clinical meanings by combining concepts with appropriate relationships, enabling expression of nearly any clinical scenario.

Post-coordination Example: "Fracture of left femur due to fall"

Individual Pre-coordinated Concepts:



Post-coordination Benefits

✓ Express unlimited clinical scenarios without pre-defining every combination
✓ Maintain precision and semantic consistency across expressions

📋 Clinical Post-coordination Examples

Example 1: Complex Medication Order

Expression: "Amoxicillin 500mg oral capsule, three times daily for 7 days"

Components: Drug concept + Dose form + Strength + Route + Frequency + Duration

Example 2: Detailed Surgical Procedure

Expression: "Laparoscopic appendectomy with drainage of right lower quadrant abscess"

Components: Procedure + Method + Anatomical site + Laterality + Additional procedure

Example 3: Specific Clinical Finding

Expression: "Moderate persistent asthma with acute exacerbation"

Components: Disease + Severity + Clinical course + Current status

SNOMED CT Compositional Grammar Syntax:

```
ConceptId | Term | : { RelationshipType | = ConceptId | Term | }

Example:
64572001 | Disease | : {
  363698007 | Finding site | = 80891009 | Heart structure |,
  246112005 | Severity | = 24484000 | Severe |
}
```

Key Advantages of Post-coordination:

- ✓ Eliminates need for pre-defining every possible clinical concept combination
- ✓ Provides flexibility to express patient-specific clinical details
- ✓ Maintains semantic interoperability across different systems
- ✓ Supports precise documentation of complex clinical scenarios
- ✓ Enables scalable terminology without exponential growth in concept count
- ✓ Facilitates implementation in electronic health record systems globally

🌍 Global Adoption

SNOMED CT is used in over 40 countries worldwide and is recognized as a global standard for clinical terminology. Its post-coordination capabilities enable healthcare systems across different languages and cultures to express clinical concepts precisely while maintaining semantic interoperability. Major implementations include national health systems in the United States, United Kingdom, Australia, and many European countries.