Organism

<table>
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<th>Definition</th>
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| Organisms of significance to human medicine | • 3265006 | Genus Candida (organism)  
• 710877000 | Beta-lactam resistant bacteria (organism) |

Organism concepts

Organism concepts are used:
- In modeling cause of disease
- To document the cause of reportable or notifiable diseases
- In evidence-based infectious disease protocols, e.g. in clinical decision-support systems

Organisms with qualifiers

Intrinsic qualifiers

If a qualifier is an intrinsic part of an organism, it belongs in the organism hierarchy and is modeled accordingly. Intrinsic should be interpreted as a characteristic that is inherent in the organism (e.g. Gram-positive), as opposed to a context-dependent characteristic (e.g. some uses of intracellular).

When modeling organisms with qualifiers, the qualifier should be placed in front of the organism name.

Morphology qualifiers

For example, a non-Linnaean class of bacteria described by morphology

- 8745002 | Gram-positive bacterium (organism)  
- 416963001 | Helical Gram-negative bacillus (organism)

Physiology qualifiers

For example, a non-Linnaean class of bacteria described by physiology

- 59343002 | Anaerobic bacteria (organism)  
- 417454003 | Non-motile Salmonella (organism)

Resistance / susceptibility qualifiers

For example, a non-Linnaean class of bacteria described by antimicrobial susceptibility

- 712662001 | Carbapenem resistant Enterobacteriaceae (organism)  
- 417943000 | Methicillin susceptible Staphylococcus aureus (organism)

Modeling with resistance-type qualifiers

Organisms with resistance-type qualifiers, i.e. where the qualifiers refer to the resistance phenotype and the organisms that are defined by the mechanism underlying the resistance phenotype, appear in the literature and are sometimes used interchangeably. However, in creating new concepts, these terms should be distinguished as they are separate concepts. For resistance-type qualifiers, use the antimicrobial agent as opposed to the enzyme that the organism is producing against the said antimicrobial agent.

For example,

- Carbapenem resistant enterobacteriaceae and carbapenemase-producing enterobacteriaceae share a significant overlap, but the former refers to the resistance phenotype, regardless of the mechanism of resistance. The presence of gene and carbapenemase production, as a resistance mechanism, usually results in clinically relevant levels of carbapenem resistance. However, it is possible to have only reduced susceptibility.

Growth morphology
Growth morphology is not an always and necessarily true characteristic of an organism and therefore should not be considered an intrinsic characteristic. The terms representing growth morphology such as Branching Gram-positive bacillus present or Gram-positive cocci in chains present are usually used for reporting a visual finding that is a characteristic of a sample. These terms should be represented as findings.

For example, 1231428004 [Beaded branching Gram-positive bacilli present (finding)]

Validity

A number of qualifiers might be valid (e.g. aerobic microaerophilic, motile curved gram-negative bacteria). To determine the sequence, the decision-making process is stepwise as follows:

- Determined on a case-by-case basis
- Highly dependent on fitting in with the model limitations
- Based on Bergey's Manual of Systematic Bacteriology as the primary reference

When requesting a new qualifier, an acceptable reference must be provided. Concepts with valid qualifiers are added to the International Release.

Organism groupings

Only authoritative taxonomic groupings are added to the SNOMED CT International Release. When requesting new organism concepts, authoritative references must be provided. Acceptance is determined on a case-by-case basis by authors. These concepts may evolve over time as the names evolve.

Complex or Group

The terms “complex” and “group” are often used in scientific papers. Laboratories then reflect the words they see in those papers in their local descriptions. However, the terms used in scientific papers are not authoritative taxonomic groupings; rather, they are just concepts used for ease of publication and grouping sets of organisms that are similar in certain functions or structure.

Implementers must be aware these types of concepts may evolve over time. As the sophistication of microbiology labs increases, the “members” of each complex may change and the complex concepts actually become obsolete. For example, this has occurred for some of the Centers for Disease Control and Prevention (CDC) groups where a number of these concepts have actually been given names and the CDC group name is archaic.

When requesting a new group or complex, an acceptable authoritative reference must be provided. The reference should clearly specify the list of species and subspecies associated with the complex/group.

Existing complex or group concepts, with grouper concepts separate from the genus, but with the same meaning as the genus, will be inactivated in the SNOMED CT International Release.

Descriptions with group or complex as synonyms of the genus, will be deprecated from the SNOMED CT International Release (The genus concept should be used for these concepts).

Microorganisms

Microorganisms is a common grouping name for organisms, but it does not align with Linnaean classification. Microorganisms are organisms that can only be seen using microscopy. Four major classes could reasonably be assigned to microorganism at the highest levels. Viruses, prions, bacteria and archaea are all microscopic. Fungi are both microscopic and macroscopic and this is also true for animals. Finally, there are examples of organisms (e.g. Phylum Nemata) that are macroscopic as adults but diagnostic life-cycle stages such as eggs and larvae are microscopic. Assigning and maintaining all subtypes to this seemingly familiar organism group is problematic and would be time and resource intensive. This concept has been deprecated and will not be added to the organism hierarchy.

Biotype, Serotype, Serogroup

Requests for new concepts are evaluated on a case-by-case basis.

It is important to understand the meaning from the requestor and determine how it can be modeled.

These concepts may evolve over time as the names evolve.

X-like Organism
"X-like" organism is a term construction used in the medical lexicon that is outside the classic Linnaean taxonomy. "X-like" organisms are identified by their similarity to some other organism. There is no single category or use of X-like organism terms; the meaning of these terms is context-dependent and open to interpretation when no context is provided. For many of these terms, the meaning will change with time. In some cases, this leads to a chain of terms that remains in colloquial use but loses value and place in the scientific literature. In addition, while reporting X-like organisms is clinically significant—unlike “untypeable” concepts—they cannot have a specific parent. These concepts are added:

- only if clear context is provided by the requester; and
- under the highest level concepts in the “organism” hierarchy i.e. direct parents would be Virus, Bacteria, Fungus.

Provisional serotypes

Provisional serotypes, i.e. serotypes that have been defined but not given a number in the antigenic schema, are considered for addition on an ad hoc basis and only if it can be confirmed that this is a reproducible assignment not being duplicated by multiple organizations.

Multidrug-resistant, extensively drug-resistant, pan drug-resistant bacteria

SNOMED International adopted the recommendations of a joint initiative of the European Centre for Disease Prevention and Control (ECDC) and the CDC for the characterization of the different patterns of resistance found in healthcare-associated, antimicrobial resistant bacteria. A panel of international experts convened and drafted a proposal which provides clear consensus definitions. Please refer to the following article for details: Magi orakos, A. Srinivasan, A. Multidrug-resistant, extensively drug-resistant and pandrug-resistant bacteria: an international expert proposal for interim standard definitions for acquired resistance. *Clinical Microbiol Infect* 2012; 18: 268-281.