

## UMLS Semantic types

We used two lists of Type Unique Identifier (TUI) semantic types:

- Semantic type list  $\alpha$  which consists of 47 types (CHEM, DISO, PHEN and PHYS). The selected types are underlined;
- Semantic type list  $\beta$  which is an extension of the previous list – with 85 types. The given types are bolded.

Category code	Category description	Type code TUI	Type description
ACTI	Activities & Behaviors	T052	Activity
ACTI	Activities & Behaviors	T053	Behavior
ACTI	Activities & Behaviors	T056	Daily or Recreational Activity
ACTI	Activities & Behaviors	T051	Event
ACTI	Activities & Behaviors	T064	Governmental or Regulatory Activity
ACTI	Activities & Behaviors	T055	Individual Behavior
ACTI	Activities & Behaviors	T066	Machine Activity
ACTI	Activities & Behaviors	T057	Occupational Activity
ACTI	Activities & Behaviors	T054	Social Behavior
<b>ANAT</b>	<b>Anatomy</b>	<b>T017</b>	<b>Anatomical Structure</b>
<b>ANAT</b>	<b>Anatomy</b>	<b>T029</b>	<b>Body Location or Region</b>
<b>ANAT</b>	<b>Anatomy</b>	<b>T023</b>	<b>Body Part, Organ, or Organ Component</b>
<b>ANAT</b>	<b>Anatomy</b>	<b>T030</b>	<b>Body Space or Junction</b>
<b>ANAT</b>	<b>Anatomy</b>	<b>T031</b>	<b>Body Substance</b>
<b>ANAT</b>	<b>Anatomy</b>	<b>T022</b>	<b>Body System</b>
<b>ANAT</b>	<b>Anatomy</b>	<b>T025</b>	<b>Cell</b>
<b>ANAT</b>	<b>Anatomy</b>	<b>T026</b>	<b>Cell Component</b>
<b>ANAT</b>	<b>Anatomy</b>	<b>T018</b>	<b>Embryonic Structure</b>
<b>ANAT</b>	<b>Anatomy</b>	<b>T021</b>	<b>Fully Formed Anatomical Structure</b>
<b>ANAT</b>	<b>Anatomy</b>	<b>T024</b>	<b>Tissue</b>
<u>CHEM</u>	<u>Chemicals &amp; Drugs</u>	<u>T116</u>	<u>Amino Acid, Peptide, or Protein</u>
<u>CHEM</u>	<u>Chemicals &amp; Drugs</u>	<u>T195</u>	<u>Antibiotic</u>
<u>CHEM</u>	<u>Chemicals &amp; Drugs</u>	<u>T123</u>	<u>Biologically Active Substance</u>
<u>CHEM</u>	<u>Chemicals &amp; Drugs</u>	<u>T122</u>	<u>Biomedical or Dental Material</u>
<u>CHEM</u>	<u>Chemicals &amp; Drugs</u>	<u>T103</u>	<u>Chemical</u>
<u>CHEM</u>	<u>Chemicals &amp; Drugs</u>	<u>T120</u>	<u>Chemical Viewed Functionally</u>

Category code	Category description	Type code	TUI	Type description
<u>CHEM</u>	<u>Chemicals &amp; Drugs</u>	<u>T104</u>		<u>Chemical Viewed Structurally</u>
<u>CHEM</u>	<u>Chemicals &amp; Drugs</u>	<u>T200</u>		<u>Clinical Drug</u>
<u>CHEM</u>	<u>Chemicals &amp; Drugs</u>	<u>T196</u>		<u>Element, Ion, or Isotope</u>
<u>CHEM</u>	<u>Chemicals &amp; Drugs</u>	<u>T126</u>		<u>Enzyme</u>
<u>CHEM</u>	<u>Chemicals &amp; Drugs</u>	<u>T131</u>		<u>Hazardous or Poisonous Substance</u>
<u>CHEM</u>	<u>Chemicals &amp; Drugs</u>	<u>T125</u>		<u>Hormone</u>
<u>CHEM</u>	<u>Chemicals &amp; Drugs</u>	<u>T129</u>		<u>Immunologic Factor</u>
<u>CHEM</u>	<u>Chemicals &amp; Drugs</u>	<u>T130</u>		<u>Indicator, Reagent, or Diagnostic Aid</u>
<u>CHEM</u>	<u>Chemicals &amp; Drugs</u>	<u>T197</u>		<u>Inorganic Chemical</u>
<u>CHEM</u>	<u>Chemicals &amp; Drugs</u>	<u>T114</u>		<u>Nucleic Acid, Nucleoside, or Nucleotide</u>
<u>CHEM</u>	<u>Chemicals &amp; Drugs</u>	<u>T109</u>		<u>Organic Chemical</u>
<u>CHEM</u>	<u>Chemicals &amp; Drugs</u>	<u>T121</u>		<u>Pharmacologic Substance</u>
<u>CHEM</u>	<u>Chemicals &amp; Drugs</u>	<u>T192</u>		<u>Receptor</u>
<u>CHEM</u>	<u>Chemicals &amp; Drugs</u>	<u>T127</u>		<u>Vitamin</u>
CONC	Concepts & Ideas	T185		Classification
CONC	Concepts & Ideas	T077		Conceptual Entity
CONC	Concepts & Ideas	T169		Functional Concept
CONC	Concepts & Ideas	T102		Group Attribute
CONC	Concepts & Ideas	T078		Idea or Concept
CONC	Concepts & Ideas	T170		Intellectual Product
CONC	Concepts & Ideas	T171		Language
CONC	Concepts & Ideas	T080		Qualitative Concept
CONC	Concepts & Ideas	T081		Quantitative Concept
CONC	Concepts & Ideas	T089		Regulation or Law
CONC	Concepts & Ideas	T082		Spatial Concept
CONC	Concepts & Ideas	T079		Temporal Concept
DEVI	Devices	T203		Drug Delivery Device
DEVI	Devices	T074		Medical Device
DEVI	Devices	T075		Research Device
<u>DISO</u>	<u>Disorders</u>	<u>T020</u>		<u>Acquired Abnormality</u>
<u>DISO</u>	<u>Disorders</u>	<u>T190</u>		<u>Anatomical Abnormality</u>
<u>DISO</u>	<u>Disorders</u>	<u>T049</u>		<u>Cell or Molecular Dysfunction</u>
<u>DISO</u>	<u>Disorders</u>	<u>T019</u>		<u>Congenital Abnormality</u>
<u>DISO</u>	<u>Disorders</u>	<u>T047</u>		<u>Disease or Syndrome</u>
<u>DISO</u>	<u>Disorders</u>	<u>T050</u>		<u>Experimental Model of Disease</u>
<u>DISO</u>	<u>Disorders</u>	<u>T033</u>		<u>Finding</u>
<u>DISO</u>	<u>Disorders</u>	<u>T037</u>		<u>Injury or Poisoning</u>
<u>DISO</u>	<u>Disorders</u>	<u>T048</u>		<u>Mental or Behavioral Dysfunction</u>

Category code	Category description	Type code TUI	Type description
<u>DISO</u>	<u>Disorders</u>	<u>T191</u>	<u>Neoplastic Process</u>
<u>DISO</u>	<u>Disorders</u>	<u>T046</u>	<u>Pathologic Function</u>
<u>DISO</u>	<u>Disorders</u>	<u>T184</u>	<u>Sign or Symptom</u>
GENE	Genes & Molecular Sequences	T087	Amino Acid Sequence
GENE	Genes & Molecular Sequences	T088	Carbohydrate Sequence
GENE	Genes & Molecular Sequences	T028	Gene or Genome
GENE	Genes & Molecular Sequences	T085	Molecular Sequence
GENE	Genes & Molecular Sequences	T086	Nucleotide Sequence
GEOG	Geographic Areas	T083	Geographic Area
LIVB	<b>Living Beings</b>	<b>T100</b>	<b>Age Group</b>
LIVB	<b>Living Beings</b>	<b>T011</b>	<b>Amphibian</b>
LIVB	<b>Living Beings</b>	<b>T008</b>	<b>Animal</b>
LIVB	<b>Living Beings</b>	<b>T194</b>	<b>Archaeon</b>
LIVB	<b>Living Beings</b>	<b>T007</b>	<b>Bacterium</b>
LIVB	<b>Living Beings</b>	<b>T012</b>	<b>Bird</b>
LIVB	<b>Living Beings</b>	<b>T204</b>	<b>Eukaryote</b>
LIVB	<b>Living Beings</b>	<b>T099</b>	<b>Family Group</b>
LIVB	<b>Living Beings</b>	<b>T013</b>	<b>Fish</b>
LIVB	<b>Living Beings</b>	<b>T004</b>	<b>Fungus</b>
LIVB	<b>Living Beings</b>	<b>T096</b>	<b>Group</b>
LIVB	<b>Living Beings</b>	<b>T016</b>	<b>Human</b>
LIVB	<b>Living Beings</b>	<b>T015</b>	<b>Mammal</b>
LIVB	<b>Living Beings</b>	<b>T001</b>	<b>Organism</b>
LIVB	<b>Living Beings</b>	<b>T101</b>	<b>Patient or Disabled Group</b>
LIVB	Living Beings	T002	Plant
LIVB	<b>Living Beings</b>	<b>T098</b>	<b>Population Group</b>
LIVB	<b>Living Beings</b>	<b>T097</b>	<b>Professional or Occupational Group</b>
LIVB	<b>Living Beings</b>	<b>T014</b>	<b>Reptile</b>
LIVB	<b>Living Beings</b>	<b>T010</b>	<b>Vertebrate</b>
LIVB	<b>Living Beings</b>	<b>T005</b>	<b>Virus</b>
OBJC	Objects	T071	Entity
OBJC	Objects	T168	Food
OBJC	Objects	T073	Manufactured Object
OBJC	Objects	T072	Physical Object
OBJC	Objects	T167	Substance
OCCU	Occupations	T091	Biomedical Occupation or Discipline
OCCU	Occupations	T090	Occupation or Discipline
ORGA	Organizations	T093	HealthCare Related Organization
ORGA	Organizations	T092	Organization
ORGA	Organizations	T094	Professional Society
ORGA	Organizations	T095	Self-help or Relief Organization

Category code	Category description	Type code	TUI	Type description
<u>PHEN</u>	<u>Phenomena</u>	<u>T038</u>		<u>Biologic Function</u>
<u>PHEN</u>	<u>Phenomena</u>	<u>T069</u>		<u>Environmental Effect of Humans</u>
<u>PHEN</u>	<u>Phenomena</u>	<u>T068</u>		<u>Human-caused Phenomenon or Process</u>
<u>PHEN</u>	<u>Phenomena</u>	<u>T034</u>		<u>Laboratory or Test Result</u>
<u>PHEN</u>	<u>Phenomena</u>	<u>T070</u>		<u>Natural Phenomenon or Process</u>
<u>PHEN</u>	<u>Phenomena</u>	<u>T067</u>		<u>Phenomenon or Process</u>
<u>PHYS</u>	<u>Physiology</u>	<u>T043</u>		<u>Cell Function</u>
<u>PHYS</u>	<u>Physiology</u>	<u>T201</u>		<u>Clinical Attribute</u>
<u>PHYS</u>	<u>Physiology</u>	<u>T045</u>		<u>Genetic Function</u>
<u>PHYS</u>	<u>Physiology</u>	<u>T041</u>		<u>Mental Process</u>
<u>PHYS</u>	<u>Physiology</u>	<u>T044</u>		<u>Molecular Function</u>
<u>PHYS</u>	<u>Physiology</u>	<u>T032</u>		<u>Organism Attribute</u>
<u>PHYS</u>	<u>Physiology</u>	<u>T040</u>		<u>Organism Function</u>
<u>PHYS</u>	<u>Physiology</u>	<u>T042</u>		<u>Organ or Tissue Function</u>
<u>PHYS</u>	<u>Physiology</u>	<u>T039</u>		<u>Physiologic Function</u>
<u>PROC</u>	<u>Procedures</u>	<u>T060</u>		<u>Diagnostic Procedure</u>
PROC	Procedures	T065		Educational Activity
<u>PROC</u>	<u>Procedure</u>	<u>T058</u>		<u>HealthCare Activity</u>
PROC	Procedures	T059		Laboratory Procedure
PROC	Procedures	T063		Molecular Biology Research Technique
PROC	Procedures	T062		Research Activity
<u>PROC</u>	<u>Procedures</u>	<u>T061</u>		<u>Therapeutic or Preventive Procedure</u>