

Conditions Update for 2018

Taking the lead for system interoperability of cancer diagnoses

In 2013, MolecularMatch integrated SNOMED-CT as our technology's primary condition (disease) dataset. For months and years after, oncologists and scientists at MM added a layer of curation so that it fits with modern cancer diagnoses. This included editing and adding new conditions and synonyms, and creating genetic composite conditions. Since then, SNOMED has improved their oncology terms. Also, several open-source disease datasets have been launched; further improving how cancer diagnoses are described and coded.

Matching patients to clinical trials, targeted drugs, and assertion evidence guidelines depends on an accurate diagnoses and consistent interpretation between healthcare systems. Therefore in 2018, we upgraded our condition system, accomplishing the goals of:

1. Allowing cohesive code-based searching to improve EHR/Payer/LIMS integrations.
 2. Updating to the most modern data ontologies.
 3. Data validation and duplicates merging with pathologist oversight.
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MolecularMatch NLP entity extraction and search engines run on ontologies. These include our conditions and findings, our in-house developed [molecular ontology](#) and our global clinical trial aggregation. As our experience with data aggregation has grown, we've developed a protocol that allows for easy integration of big data to enhance our search engines. This high-level protocol is:

1. Acquire datasets in their native form on frequent intervals.
 2. Identification strategy and merging to allow diverse inputs and avoid duplicates.
 3. Incorporate into our API and other products for broad use.
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Condition Data Incorporated into MM

Condition terms are now searchable by prefix_code (e.g. `SNOMEDID_255035007`).

Search Prefix	Dataset Name	Records Count
SNOMEDID	Systematized Nomenclature of Medicine -- Clinical Terms	313,940
ICD10	10th rev. of the International Statistical Classification of Diseases	94,127
DOID	DiseaseOntology -- open source medical vocabulary	12,498
ONCOTREE	OncoTree -- curated cancer type ontology by Memorial Sloan Kettering Cancer Center	627

Additional datasets worth integrating are: **ICD9** and **LOINC**. Through DiseaseOntology, we have cross mapping of terms to MeSH, NCI's thesaurus and OMIM as well.

All datasets are easily updated on new releases. The current SNOMED-CT version is [v20170901 U.S. edition](#).

Dataset Mapping

We always design a feedback loop between clinical expertise and software automation. We do this by building easy to use, internal data management tools for training from M.D. and Ph.D. curators. This condition data upgrade required more than **300** M.D. pathologist curation hours.

Mapping efforts:

- ICD10 → SNOMED -- official map [file](#) implemented w/ manual adjustment.
- OncoTree → SNOMED -- MolecularMatch pathologist manually mapped.
- DOID → SNOMED -- MolecularMatch pathologist manually mapped.

Screenshot of internal MM tools curators use to adjust mappings.

Data Management

ConditionsClinical FindingsAnatomiesStagesOncoTreeSNOMEDICD10DiseaseOntologyProcesses

Invalid OnlyOncoTree Set is INVALID

Condition Name:Clear Cell Ovarian Cancer

MetaMainType:Ovarian Cancer

Search...

ID (OncoTree Code) ↑	Condition Name
<input type="checkbox"/> AA	Aggressive Angiomyxoma
<input type="checkbox"/> AASTR	Anaplastic Astrocytoma
<input type="checkbox"/> ACA	Adrenocortical Adenoma
<input type="checkbox"/> ACBC	Adenoid Cystic Breast Cancer
<input type="checkbox"/> ACC	Adrenocortical Carcinoma
<input type="checkbox"/> ACCC	Acinic Cell Carcinoma
<input type="checkbox"/> ACN	Acinar Cell Carcinoma, NOS
<input type="checkbox"/> ACPG	Craniopharyngioma, Adamantinomatous Type
<input type="checkbox"/> ACP	Atypical Choroid Plexus Papilloma
<input type="checkbox"/> ACRM	Acral Melanoma
<input type="checkbox"/> ACYC	Adenoid Cystic Carcinoma
<input type="checkbox"/> ADMA	Adamantinoma
<input type="checkbox"/> ADNOS	Adenocarcinoma, NOS
<input type="checkbox"/> ADPA	Aggressive Digital Papillary Adenocarcinoma
<input type="checkbox"/> AECA	Sweat Gland Carcinoma/Apocrine Eccrine Carcinoma
<input type="checkbox"/> AFX	Atypical Fibroxanthoma

SNOMED IDs

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SNOMED IDs	Custom
416712009	true

Parents from OncoTree

ID	Name
OVARY	OVARY
OVT	Ovarian Epithelial Tumor

RevertSave

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Custom Conditions and Genetic Composites

Only a handful of genetic composite conditions exist in the public datasets, like "EGFR positive NSCLC". At MM, we've created many more composites, which are necessary in our NLP engine for coalescing meaning from medical documents.

Screenshot of internal MM tools for creating composite conditions.

Data Management

ConditionsClinical FindingsAnatomiesStagesOncoTreeSNOMEDICD10DiseaseOntologyProcesses

9 (active)

All Fields

☐ Exact Match

☐ Hide Suppressed

☒ Composite

Search...

Name ↑	Composite	Custom	Suppress
<input type="checkbox"/> ALK positive large B-cell lymphoma	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
<input checked="" type="checkbox"/> AML KIT exon 8	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/> AML with mutated CEBPA	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/> AML with mutated NPM1	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/> Acute megakaryoblastic leukemia	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/> Acute myeloid leukemia with maturation, FAB M2	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/> Acute myeloid leukemia with t(9:11)(p22;q23); MLLT3-MLL	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/> Acute myelomonocytic leukemia, FAB M4	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/> Acute promyelocytic leukemia, FAB M3	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/> Adenocarcinoma of lung, TNM stage 4	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/> Anaplastic lymphoma kinase negative anaplastic large cell lymphoma	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/> Anaplastic lymphoma kinase positive large B-cell lymphoma	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/> Astrocytoma/Oligodendroglioma	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
<input type="checkbox"/> B lymphoblastic leukaemia/lymphoma with BCR-ABL1	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/> B lymphoblastic leukaemia/lymphoma with TEL-AML1	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>

Id:f8cb3180-ffd6-44e8-8cad-d91f65fba27

Name:AML KIT exon 8

Alias:AML KIT exon 8

Composite:☒

Composite Tags

Term

KIT exon 8 mutation

Acute myeloid leukemia, disease

Negative Concepts (when resolver is ran, these terms will be s

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Lets Use It!

These codes can now be used in the whole MM ecosystem. From the application search, to API queries, to EHR integration.

App Search

- ICD10_D45 = Polycythemia vera
- http://app.molecularmatch.com/search/ICD10_D45
- SNOMEDID_363478007 = Thyroid cancer
- http://app.molecularmatch.com/search/SNOMEDID_363478007
- DOID_1781 = Thyroid cancer
- http://app.molecularmatch.com/search/DOID_1781
- ONCOTREE_AML = Acute myeloid leukemia, disease
- http://app.molecularmatch.com/search/ONCOTREE_AML

API Queries

See specs on api.molecularmatch.com

```
#####
# Trials Search -- save this as a .sh file
#####

# to run include apiKey as first argument
# $ chmod 777 file.sh
# $ ./file.sh apiKey

curl -X POST 'https://api.molecularmatch.com/v2/search/trials' \
--data "apiKey=$1" \
--data-urlencode 'filters=[ \
    {"facet":"ICD10","term":"ICD10_D45"}, \
    {"facet":"STATUS", "term":"Enrolling"}, \
    {"facet":"TRIALTYPE", "term":"Interventional"} \
    ]'

curl 'https://api.molecularmatch.com/v2/search/trials' \
--data "apiKey=$1" \
--data-urlencode 'filters=[ {"facet" : "SNOMEDID", "term" : "SNOMEDID_254626006"}]'
```

```
#####
# Condition Search -- used to normalize conditions
# If you have a condition name, or code,
# you can search our conditions table to find the best match.
# This can then be used as a term in subsequent trials and drugs searches.
#####
```

```
curl -X POST 'https://api.molecularmatch.com/v2/search/conditions' \
--data "apiKey=$1" \
--data-urlencode 'filters=[{"facet":"PHRASE","term":"Lung cancer"}]'
```

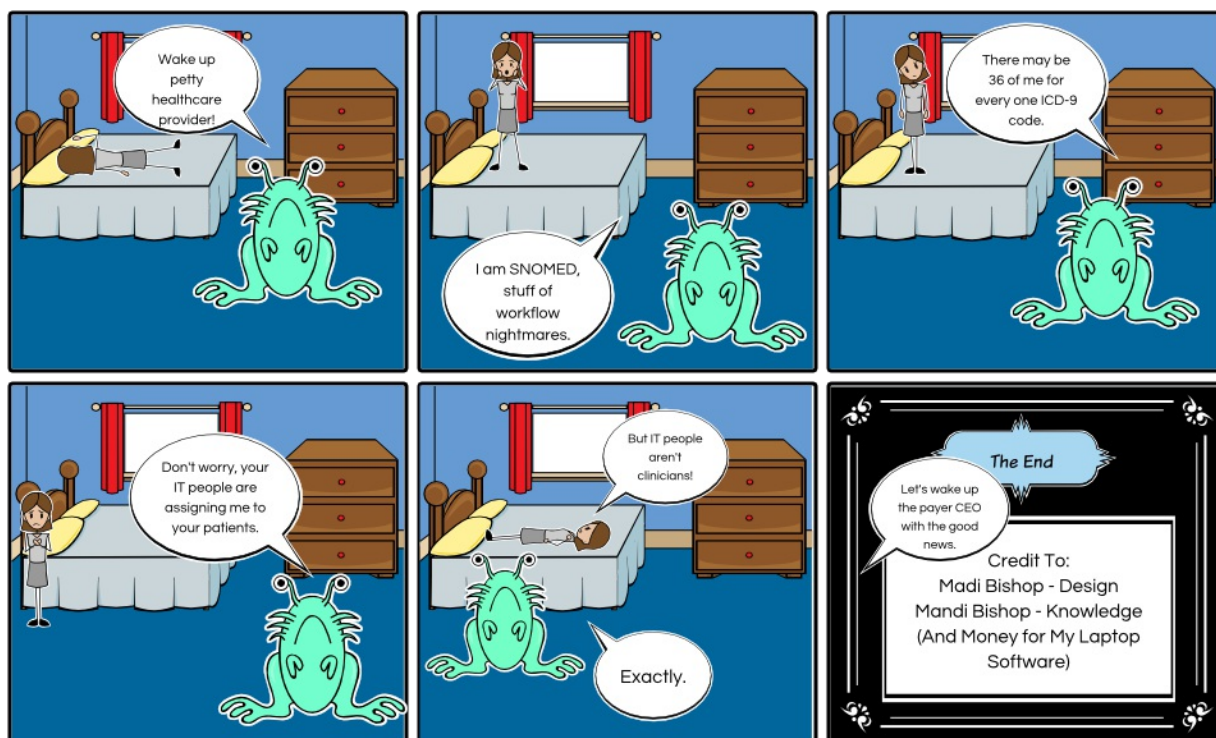
```
curl 'https://api.molecularmatch.com/v2/search/trials' \
--data "apiKey=$1" \
--data-urlencode 'filters=[{"facet" : "SNOMEDID", "term" : "SNOMEDID_254626006"}]'
```

EHR Integration

Contact Us at info@molecularmatch.com for a demonstration of how to integrate with an EHR, payer system or LIMS.

Mapping Trouble?

No mapping effort is perfect. Work with us to make sure you are getting the results you expect for your patients.



Create your own at StoryboardThat.com

From: <http://healthstandards.com/blog/2014/04/21/snomed-problems/>