Influenza IDO

Status January 2010

Influenza Ontology

• Developers
  – Melanie Courtot, BCCRC
  – Joanne Luciano, Predictive Medicine, Inc.
  – Lynn Schriml, Univ. Maryland
  – Burke Squires, Influenza Research Database (IRD) / UT Southwestern
  – Ryan Brinkman, BCCRC
  – Richard Scheuermann, IRD / UT Southwestern
Influenza Research Database (IRD)

www.fludb.org

Clinical Data

Surveillance Record Details

Collection Information
- **Collection**: SCI
- **Collector Name**: Freesman, MD
- **Collector Institution**: Freesman, MD
- **Collection Date**: 02/20/2010
- **City**: Corona
- **State/Province**: Texas
- **Country**: USA
- **Zip**: 77934
- **Latitude**: 30.235860
- **Longitude**: -95.49679

Host Information
- **Host Identifier**: SCoP004-032
- **Common Name**: Human
- **Scientific Name**: Homo Sapiens
- **Age**: 14
- **Sex**: M

Physician Clinical Data
- **Temperature**: 99.1
- **Bulbar Onset**: Sore Throat
- **Onset Hours**: 48
- **Vaccination Status**: N
- **Symptoms**: MYALGIA (None), RUNNING NOSE (None), FEVER (None), FATIGUE (None), COUGH (None), HEADACHE (None), THROAT (None)
- **Pre-Vaccination Medications**: PAIN RELIEVER, ANTHISTAMINE
- **Diagnosis**: FLU
- **Post-Vaccination Medications**:はありません

Sample Information
- **Sample Identifier**: N91S-010756
- **Sample Material**: Nasal
- **Positive for Flu**: Positive
- **Virus Type**: A
- **Genotype**: H1N1
- **Brain Name**: A/Texas/03/2007
- **View Brain Detail**: A/Texas/03/2007/H1N1
Wild Bird Surveillance

Surveillance Record Details

Collection Information
- Collection: ST. JUDE
- Collector Institution: CANARIO.
- Collection Date: 04/11/1979
- State/Province: Alberta
- Country: Canada

Host Information
- Host Identifier: S/L.A./blue-winged titi/ALS/1979
- Common Name: Blue-winged Titi
- Scientific Name: Anas discors
- Bird Behavior: Wild
- Age Class: Adult
- Sex: M
- Health: Healthy
- Order: Anseriformes
- Family: Anatidae
- NCBI Taxonomy ID: 1484

Sample Information

<table>
<thead>
<tr>
<th>Sample/Identifier</th>
<th>Sample Material</th>
<th>Positive for Flu</th>
<th>Virus Type</th>
<th>Serotype</th>
<th>Strain Name</th>
<th>View Strain/Detail</th>
</tr>
</thead>
</table>

Sequence Features

Segment Information
- Genebank Source Sequence: CY934844
- Accession:
- Definition: Influenza A virus (Blue-winged titi/ALS/1979/H9N2) segment 1, complete sequence.
- Segment Number: 1
- Segment Length: 1241
- Sequence: View sequence

Segment Annotation

Protein Information
- Protein Name: PB2 Polymerase (basic) protein 2
- Protein Accession: Q01267.1

Phenotype Marker

Isoelectric pt/Molecular Weight (SCOP)
- Isoelectric pt: B.93
- Molecular Weight: 20,904.1

HMM/Pfam Domains (SCOP)
- Domain Name: P01412
Influenza Ontology Domains

- Host and Pathogen
  - Anatomy
  - Taxonomy
- Biological Material (specimens)
- Infectious Disease (disease features & clinical findings)
- Laboratory Experiment (scientific procedures)
- Surveillance for transmission and prevalence
<table>
<thead>
<tr>
<th>RELATION TO TIME</th>
<th>CONTINUANT</th>
<th>OCCURRENT</th>
</tr>
</thead>
<tbody>
<tr>
<td>GRANULARITY</td>
<td>INDEPENDENT</td>
<td>DEPENDENT</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>COMPLEX OF ORGANISMS</th>
<th>CONTINUANT</th>
<th>OCCURRENT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Family, Community, Deme, Population</td>
<td>Population Phenotype</td>
<td>Population Process</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>ORGAN AND ORGANISM</th>
<th>Continuants</th>
<th>Occurrents</th>
</tr>
</thead>
<tbody>
<tr>
<td>Organism (NCBI Taxonomy)</td>
<td>Phenotypic Quality (PaTO)</td>
<td>Biological Process (GO)</td>
</tr>
<tr>
<td>Anatomical Entity (FMA, CARO)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>CELL AND CELLULAR COMPONENT</th>
<th>Continuants</th>
<th>Occurrents</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cell (CL)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cellular Component (FMA, GO)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>MOLECULE</th>
<th>Continuants</th>
<th>Occurrents</th>
</tr>
</thead>
<tbody>
<tr>
<td>Molecule (ChEBI, SO, RnaO, PrO)</td>
<td>Molecular Function (GO)</td>
<td>Molecular Process (GO)</td>
</tr>
</tbody>
</table>

http://obofoundry.org

Upper-level: Basic Formal Ontology (BFO)

Other OBO Foundry ontologies available at http://www.obofoundry.org/
Example terms from Influenza Ontology

- Surveillance (Avian)
  - Wild
  - Domestic
  - Migratory / non-migratory
- Virus Experimental Infection Event
  - Route of delivery
  - Amount delivered (Volume)
  - Amount delivered (Titer)
  - Passage time period
- Sequence Changes (Analysis)
  - Virus sequence residue type
  - Virus sequence residue number
  - Virus specimen source residue
  - Post passage residue

Timeline to Version 1

- Version 1 includes:
  - CV terms from IRD / CEIRS use cases:
    - Minimum information for avian surveillance (IRD)
    - Minimum information for a passage experiment (IRD)
- Completed
  - Compare minimum information for avian surveillance to draft ontology terms
  - Compare draft minimum information for a passage event document
- February - March, 2010
  - Complete minimum information for passage experiment comparison
  - Add missing terms from minimum information document to ontology
  - Submit new terms to reference ontology
- April, 2010
  - Draft submitted to OBO Foundry
  - ~75 Terms in Version 1
Virus Pathogen Database and Analysis Resource (ViPR)

Disease Ontology needs

- Viral encephalitis
- Viral hemorrhagic fever
- Viral hepatitis
- Influenza
Influenza Ontology & IDO

- Influenza ontology is an extension of IDO
- Additionally, Influenza Ontology covers domains outside of IDO (e.g. surveillance)

A disease is a disposition rooted in a physical disorder in the organism and realized in pathological processes.
### Influenza - infectious

- **Etiological process** - infection of airway epithelial cells with influenza virus
  - produces
- **Disorder** - viable cells with influenza virus
  - bears
- **Disposition (disease)** - flu
  - realized in
- **Pathological process** - acute inflammation
  - produces
- **Abnormal bodily features**
  - recognized as
- **Symptoms** - weakness, dizziness
- **Signs** - fever
- **Symptoms & Signs**
  - used in
- **Interpretive process**
  - produces
- **Hypothesis** - rule out influenza
  - suggests
- **Laboratory tests**
  - produces
- **Test results** - elevated serum antibody titers
  - used in
- **Interpretive process**
  - produces
- **Result** - diagnosis that patient X has a disorder that bears the disease flu