SARS-CoV-2 and related nomenclature

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Collaborating to rapidly create new terminology

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SARS-CoV-2 and related nomenclature
Current SARS-CoV-2 nomenclature

Virus: Severe acute respiratory syndrome coronavirus 2
    (SARS coronavirus 2; SARS-CoV-2)
Species: SARS-related coronavirus
Disease: COVID-19
    (based on Coronavirus disease 2019)

LOINC terms for SARS-CoV-2 lab tests have SARS coronavirus 2 in the Component because the tests are looking for the virus, not the disease
Virus name evolution


World Health Organization (WHO) is responsible for disease names. When they announced COVID-19 as the name of the disease, it was mistakenly picked up by media outlets as the name of the virus

International Committee on Taxonomy of Viruses (ICTV) is responsible for virus classification and species-level naming
Species name evolution

2003: Severe acute respiratory syndrome coronavirus (SARS coronavirus; SARS-CoV) identified as the causative agent for severe acute respiratory syndrome (SARS)
   Classified as a species in the genus Coronavirus

2009: species renamed Severe acute respiratory syndrome-related coronavirus (SARS-related CoV)
   Reclassified under new genus Betacoronavirus

2018: species reclassified under new sub-genus Sarbecovirus

*SARS-CoV and SARS-CoV-2 are two viruses in SARS-related CoV species*

MERS coronavirus

2015: Middle east respiratory syndrome-related coronavirus (MERS-related coronavirus) identified as the causative agent for Middle east respiratory syndrome (MERS)

   Classified in the genus Betacoronavirus (which was created in 2009) along with SARS-related CoV

2018: Reclassified under new sub-genus Merbecovirus

*SARS-CoV, SARS-CoV-2, and MERS-related CoV are all in the genus Betacoronavirus but two different sub-genuses*
Orthocoronavirinae classification

<table>
<thead>
<tr>
<th>Subfamily: Orthocoronavirinae</th>
<th>Family: Coronaviridae</th>
<th>4 genera</th>
<th>history</th>
</tr>
</thead>
<tbody>
<tr>
<td>+ Genus: Alphacoronavirus</td>
<td>Subfamily: Orthocoronavirinae</td>
<td>12 subgenera</td>
<td>history</td>
</tr>
<tr>
<td>- Genus: Betacoronavirus</td>
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<td>5 subgenera</td>
<td>history</td>
</tr>
<tr>
<td>+ Subgenus: Embecovirus</td>
<td>Genus: Betacoronavirus</td>
<td>4 species</td>
<td>history</td>
</tr>
<tr>
<td>+ Subgenus: Hibecovirus</td>
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<td>1 species</td>
<td>history</td>
</tr>
<tr>
<td>- Subgenus: Merbecovirus</td>
<td>Genus: Betacoronavirus</td>
<td>4 species</td>
<td>history</td>
</tr>
<tr>
<td>Species: Hedgehog coronavirus 1</td>
<td>Subgenus: Merbecovirus</td>
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<tr>
<td>Species: Middle East respiratory syndrome-related coronavirus</td>
<td>Subgenus: Merbecovirus</td>
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</tr>
<tr>
<td>Species: Pipistrellus bat coronavirus HKU5</td>
<td>Subgenus: Merbecovirus</td>
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<td>Species: Tylonycterus bat coronavirus HKU4</td>
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<tr>
<td>+ Subgenus: Nobecovirus</td>
<td>Genus: Betacoronavirus</td>
<td>2 species</td>
<td>history</td>
</tr>
<tr>
<td>- Subgenus: Sarbecovirus</td>
<td>Genus: Betacoronavirus</td>
<td>1 species</td>
<td>history</td>
</tr>
<tr>
<td>Species: Severe acute respiratory syndrome-related coronavirus</td>
<td>Subgenus: Sarbecovirus</td>
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<tr>
<td>+ Genus: Gammacoronavirus</td>
<td>Subfamily: Orthocoronavirinae</td>
<td>2 subgenera</td>
<td>history</td>
</tr>
</tbody>
</table>

https://talk.ictvonline.org/taxonomy
SARS-CoV-2 classification summary

Genus: Betacoronavirus
Sub-genus: Sarbecovirus
Species: SARS-related coronavirus

Species contains >100 named viruses, including SARS-CoV and SARS-CoV-2, and other SARS-like coronaviruses

https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?mode=Tree&id=2509511&lvl=3&lin=f&keep=1&srchmode=1&unlock
LOINC Components explained

SARS coronavirus: test is specific for SARS-CoV
SARS coronavirus 2: test is specific for SARS-CoV-2
SARS-related coronavirus: test is looking for any of the viruses in the SARS-related coronavirus species, including SARS-CoV, SARS-CoV-2, and bat SARS-like coronaviruses

    e.g., using a region of nucleic acids that are conserved across all viruses in the SARS-related coronavirus species
aka pan-Sarbecovirus

Originally named “SARS coronavirus + SARS-like coronavirus + SARS coronavirus 2”, but SARS-related coronavirus is the most accurate
Collaborating to rapidly create new terminology
Early efforts with public health

• January 24, 2020: LOINC content team reached out to U.S. CDC contacts about creating LOINCs for the 2019 Novel Coronavirus assay (as it was called at the time) listed on the CDC website
• Shortly thereafter, FDA and APHL looped in, and Public Health Ontario submitted a new LOINC request
• Over the next week we worked closely with all of these groups to review assays and reporting details
• January 31, 2020: First set of LOINC terms representing the original U.S. CDC test kit and Public Health Ontario assays published on the LOINC prerelease page
Work with other SDOs

• We contacted WHO to get input about ICD codes, test naming, and the SARS-CoV-2 assays listed on the WHO website

• Regenstrief and SNOMED International worked together to disseminate information regarding new SNOMED-CT and LOINC terms related to COVID-19 and SARS-CoV-2

• We have links to the other SDOs information pages on the dedicated LOINC SARS-CoV-2 page, and have been updating and adding links as we learn about them
Complementary terminology across SDOs

- SNOMED-CT for the disorder, organism, substance, etc.
- ICD-10 for diagnoses
- CPT for billing (in the U.S.)

For quick reference, the new Category I CPT code and long descriptor are:

- 87635 Infectious agent detection by nucleic acid (DNA or RNA); severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) (Coronavirus disease [COVID-19]), amplified probe technique

The code is effective immediately for use as the industry standard for reporting of tests for the novel coronavirus across the nation’s health care system. In addition to the long descriptor, CPT code 87635 has short and medium descriptors that can be accessed on the AMA website.
Continued work with public health

• Since January, we have stayed in close touch with public health agencies
• Almost daily communication with APHL regarding new tests and appropriate LOINC assignments
• Received a message from U.S. CDC today about LOINC codes for data elements on the Person Under Investigations (PUI) form
  • If anyone has already mapped PUI data elements to standards, including LOINC and SNOMED-CT, please contact us so that we can connect you with the correct group at the CDC
After the initial set of terms were created, we began to receive LOINC requests for test kits approved under EUA or RUO.

To date, we have worked with multiple IVD manufacturers, laboratories, and other organizations both within and outside the U.S.

New prerelease LOINC terms have been published for molecular, serology, and antigen testing, with two new terms posted yesterday.