How do coronavirus diagnostic tests work?

(a.k.a. “Do I have / Did I have COVID-19?”)

**A. Molecular Testing**

**Virus-Derived**

- Nasal swab
- SARS-CoV-2
- RNA
- DNA

- DNA derived from patient samples is repeatedly copied and amplified

- Different colored dyes bind to genes for pieces of the virus.
- Another dye detects genes from related virus families.

**Pros**

- Early detection
- Quick processing (hours)
- Highly selective and specific

**Cons**

- Skilled personnel and equipment necessary
- Does not tell you if virus is still active
- Cannot detect those who’ve been infected and later recovered

**B. Serological Testing**

**Blood-Derived**

- SARS-CoV-2 infects a patient

- After 2 days:
  - Your spleen produces IgM, one of the first antibodies to attack coronavirus

- 9-11 days:
  - More tailored antibodies called IgG are produced

- As the patient’s immune system kicks in, the antibodies are measured using a technique called **ELISA**:

<table>
<thead>
<tr>
<th>Antibody Concentration</th>
<th>Light</th>
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**Pros**

- Rapid test available at point-of-care
- Low cost
- Can be used to test large populations
- Reliably detects exposure

**Cons**

- Cannot detect if patient is contagious or infection is still present
- Prone to false negatives if patient has deferred immune response

Credits: CDC, C&ENews, MedRxiv, Scientific American, Seegene, ThermoFisher, UniProt

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