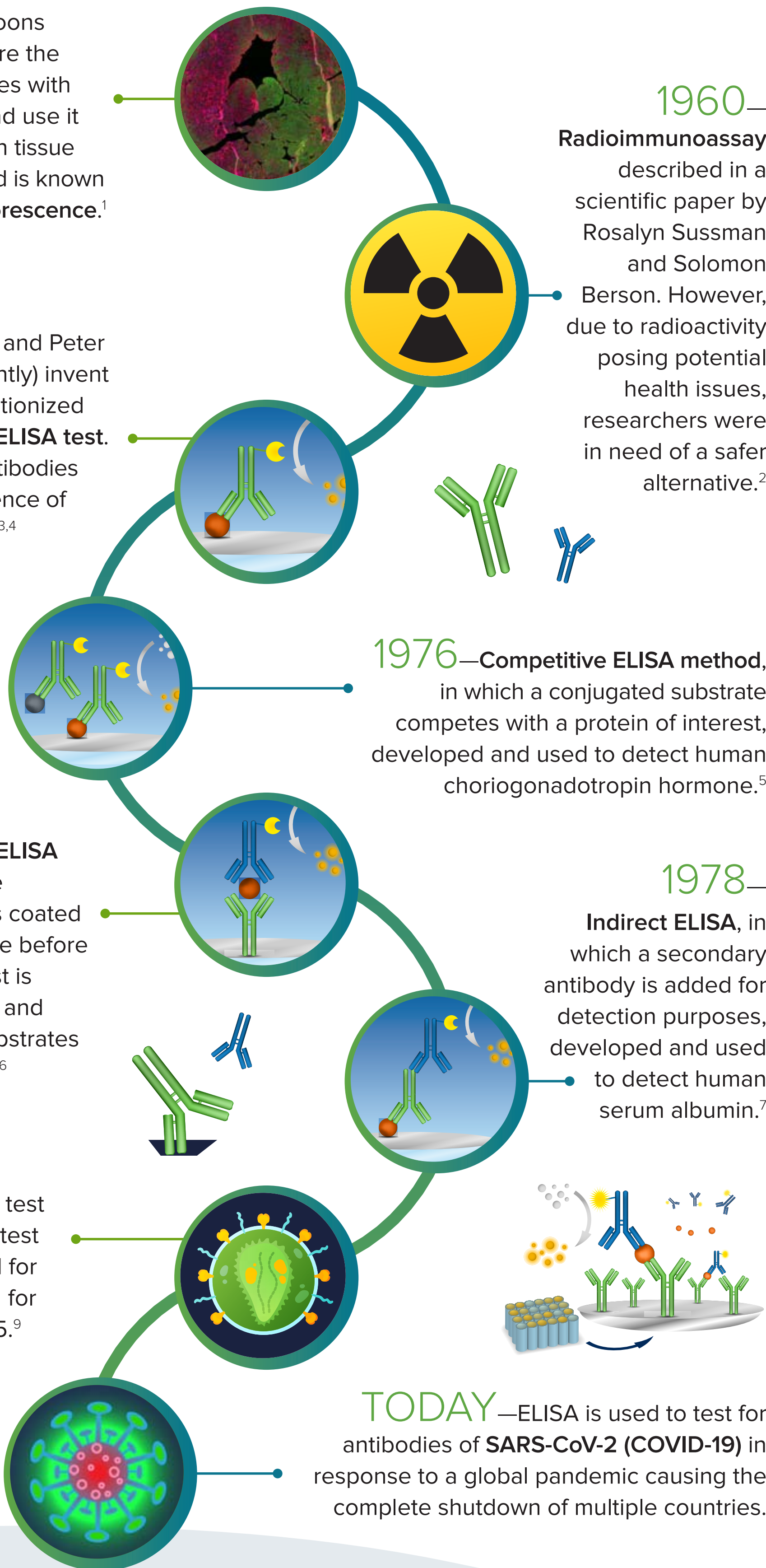
History of **ELISA**

ELISA (enzyme-linked immunosorbent assay) is a method used to quantitatively detect an antigen within a sample. An antigen is a toxin or other foreign substance, for example a flu virus or environmental contaminant, that causes the vertebrate immune system to mount a defensive response. The range of potential antigens is vast, so ELISAs are used in many areas of research and drug discovery on a wide variety of sample types. Cell lysates, blood samples, food items, and more can be analyzed for specific substances of interest using ELISAs.



1941—Albert H. Coons and his colleagues are the first to label antibodies with a fluorescent dye, and use it to identify antigens in tissue sections. This method is known today as **immunofluorescence**.[1]

1960—**Radioimmunoassay** described in a scientific paper by Rosalyn Sussman and Solomon Berson. However, due to radioactivity posing potential health issues, researchers were in need of a safer alternative.[2]

1971—Eva Engvall and Peter Perlman (independently) invent a method that revolutionized medicine called the **ELISA test**. The method uses antibodies to seek out the presence of hormones or viruses.[3,4]

1976—**Competitive ELISA method**, in which a conjugated substrate competes with a protein of interest, developed and used to detect human choriogonadotropin hormone.[5]

1977—**Sandwich ELISA method**, in which the detection antibody is coated onto the plate surface before the protein of interest is added, is developed and tested on several substrates for proof-of-concept.[6]

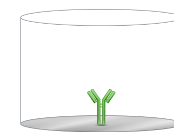
1978—**Indirect ELISA**, in which a secondary antibody is added for detection purposes, developed and used to detect human serum albumin.[7]

1985—The ELISA test is the first screening test commonly employed for **HIV**. It was approved for use on March 2, 1985.[9]

TODAY—ELISA is used to test for antibodies of **SARS-CoV-2 (COVID-19)** in response to a global pandemic causing the complete shutdown of multiple countries.

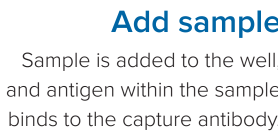
Workflow of an ELISA protocol

The workflow of a typical sandwich ELISA protocol has multiple reagent addition, incubation and wash steps. Here we've highlighted each step and the instrumentation and tools needed to conduct the ELISA assay.



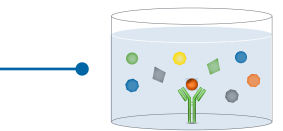
1 Capture antibody binds to wells

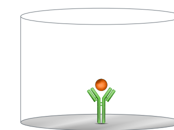
First, the capture antibody is bound to the bottom of the microplate well.



2 Add sample

Sample is added to the well, and antigen within the sample binds to the capture antibody.



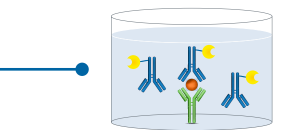


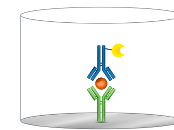
3 Wash microplate

Unbound material is washed away, leaving only the antigen of interest and minimizing the potential for high background signal.

4 Add detection antibody

Enzyme-conjugated detection antibody binds to a second site on the antigen of interest, providing the means to detect the antigen.



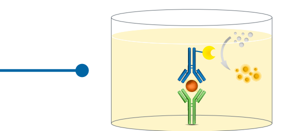


5 Wash microplate

Unbound antibodies are washed away, leaving only those specific for the target of interest and again minimizing the potential for background signal.

6 Add substrate

Substrate is converted by the enzyme on the detection antibody, producing a color change, with intensity proportional to the amount of antigen present. Depending on the enzyme and substrate used, the readout can also be fluorescent or luminescent.



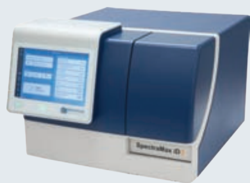
7 Read plate

The microplate reader detects the colored reaction product and outputs optical density (OD) values that indicate how much light is absorbed by the contents of each well.

8 Calculate results

The amount of antigen in each sample is calculated, and different samples—for example, cells subjected to different treatment conditions—can be compared.

SpectraMax® iD3 Multi-Mode Microplate Reader



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