

# THE DIFFERENCE BETWEEN WET AND DRY LAB RESEARCH

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Wet and dry labs can either refer to the physical laboratory spaces, as well as the methods and the research data it produces.

## WET LAB

The first idea that comes to mind for wet labs are bubbling gases, Erlenmeyer flasks and vials of bacteria. Wet lab research is conducted in traditional laboratories and often works with fluids and instruments, such as chemical solutions, gases, drugs, bacteria, enzymes, or physical optics experiments.

For the physical space, they require lab benches, sinks, refrigerators, as well as safety considerations, such as eyewash stations, safety showers, fume hoods, ventilation systems and waste disposal containers or areas to prevent issues arising from spillage and contamination.<sup>1</sup> Other specific equipment may be required depending on the particular laboratory, such as sterilization equipment for virology or bacteria labs, centrifuges for separation, and even cages for animal testing. Various taps, such as those for certain gases or distilled water, may also be installed.

## DRY LAB

The dry lab has developed from a description of physical spaces for dry material storage to referring to experiments' computational and data analysis aspects. These include modelling and prediction software.

The physical laboratories are often computer labs that require computers or other specialized robust computing systems. As a result, they may need procedures to control temperature, humidity, and potentially dust, as these can affect the labs' instruments.<sup>2</sup>

## APPLICATIONS & EXAMPLES

In modern science, wet and dry labs are often integrated with each other.

### Industrial Example: Pharmacology & High-Throughput screening

A standard method for discovering new drugs is high-throughput screening. It is an automated process that tests the effectiveness of many drugs or molecules, often by seeing if it binds to the therapeutic target such as a receptor or another molecule in the body. It has a wet lab component of testing binding and therapeutic effectiveness in aqueous solutions. Still, computers are required to filter out the potential molecules because of the sheer amount of data.

For example, one team of experimenters used high-throughput screening to test out 150,000 small organic molecules at 5 $\mu$ M concentration. This test was performed to see if it inhibited a different molecule receptor to a receptor associated with virulence enterohemorrhagic *Escherichia coli*, which causes diarrhea.<sup>3</sup> With this method, they found precisely one molecule. Testing this many molecules would be impossible without the integration of wet and dry lab.

### Molecular biology

Molecular biology is another field which was traditionally dominated by experimental wet labs, but dry labs and computation have drastically changed measures. The wet lab component mainly focused on handling

very delicate procedures, such as crystallography, PCRs, and flow cytometry, with many reagents and solutions, such as those done to find the structure of ACE2 receptors involved in COVID-19.<sup>4</sup>

The rapid development of technology to sequence entire genomes or characterize proteins has created so much data that dry lab methods of computation have become necessary. One exciting area of effect is computational biology to predict the 3D structures of proteins, which is incredibly complex due to the number of interactions between amino acids.

**As such, wet and dry labs are both crucial to the development of future research.**

## REFERENCES

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