Functional Assay

A **functional assay** is a laboratory test designed to evaluate whether a biological component (such as a gene, protein, or cell) performs its expected **biological function** under defined experimental conditions.

Definition

A functional assay is used to assess the **activity, behavior, or performance** of a biological molecule or system, often to determine its role in health or disease.

> It measures what the component **does**, not just what it **is**.

Common Applications

- Determining the effect of **genetic variants** (e.g. VUS)
- Testing **enzyme activity**
- Evaluating **drug responses** in vitro
- Measuring **cell proliferation**, apoptosis, or migration
- Assessing **receptor signaling** capacity

Examples

Target	What It Tests	Example
Enzyme	Catalytic activity	ATPase assay for energy metabolism
Receptor	Signal transduction	G-protein coupled receptor activation
Gene variant	Transcriptional regulation	Luciferase reporter assay
Cell	Proliferation/apoptosis/migration	MTT assay, scratch wound healing test

Importance

Functional assays are essential in:

- Interpreting the clinical relevance of **mutations**
- Validating **therapeutic targets**
- Exploring **mechanisms of disease**
- Confirming **biological activity** of recombinant or engineered molecules

Related Terms

- biological assay
- luciferase reporter assay

- in vitro assay
- variant of uncertain significance