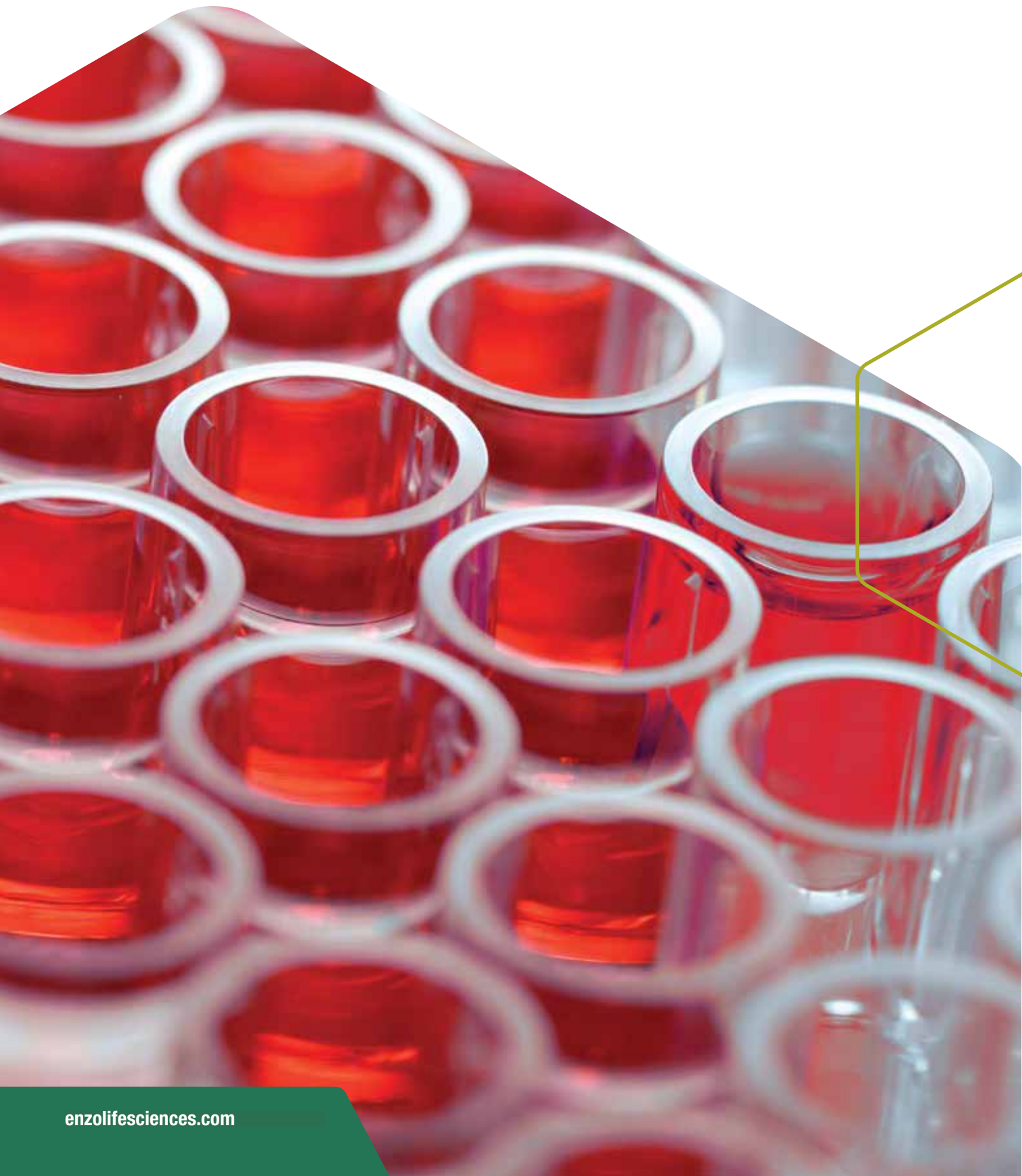




Predictive Toxicology

Innovative Solutions for Early Safety Assessment



Introduction

Enabling Early Safety Assessment

Predictive toxicology is a pivotal aspect of modern drug development, utilizing advanced scientific techniques to foresee potential adverse effects of drug candidates. By leveraging *in vitro*, *in silico*, and *in vivo* approaches, predictive toxicology aims to provide early insights into the safety profile of drug candidates, enabling efficient decision-making in drug development. This proactive approach mitigates risks and reduces the likelihood of late-stage failures, saving time and resources.

Enzo's broad range of scientific expertise and industry-proven manufacturing capabilities provide a comprehensive set of solutions for predictive toxicology when determining genotoxicity, membrane integrity, autophagy, and oxidative stress. Our products are reliable, cost-effective, and compatible with high-throughput systems.

With over 45 years of experience, R&D, and manufacturing excellence, Enzo's goal is to provide innovative tools that enhance the efficiency, cost-effectiveness, and overall success of drug discovery and development.

Enzo's products and services can help to streamline operations, making drug development more accessible and efficient.

Cellular Dys

Understanding cellular
crucial in assessing drug can
Early identification of compo
dysfunction allows for timely
drug

MITO-ID® Membran Cyto

Organ-Specific

Focused investigation help
mitigate risks associated with
harm to specific organs, cont
development of safer and
pharmacological

SCREEN-WELL® Toxicit

Innovative Solutions for Early Safety Assessment

Cell Viability

Cell viability testing is crucial for evaluating the impact of compounds on living cells, providing essential insights for safer and more effective drug development.

GFP-CERTIFIED® Apoptosis/Necrosis Detection Kit

Aggresomal Response

The presence of aggresomes may indicate cellular stress and dysfunction, allowing for the early identification of potential toxic effects induced by drugs or other substances.

PROTEOSTAT® Aggresome Detection Kit

Predictive Toxicology

Metabolic Abnormalities

A comprehensive understanding of drug-induced endocrine and metabolism abnormalities is essential for predicting adverse reactions, guiding drug design, and optimizing treatment strategies.

Cortisol ELISA Kit

Genotoxicity

Identifying genotoxic drug compounds during early preclinical studies allows for further lead refinement and lower drug attrition.

DNA Damage ELISA Kit

Cell Dysfunction

Cell dysfunction is a key indicator of candidate safety. Identifying compounds inducing cellular dysfunction allows for early adjustments in drug development.

Cellular Potential Toxicity Kit

Toxicity

Toxicity assays identify and quantify drug-induced cellular damage, contributing to the development of more targeted interventions.

Toxicity Libraries

Cell Viability

Evaluating the health of cells through viability testing is fundamental. This essential process provides valuable insights into how compounds may affect the well-being and functionality of living cells, contributing significantly to the quest for a safer and a more effective drug development.

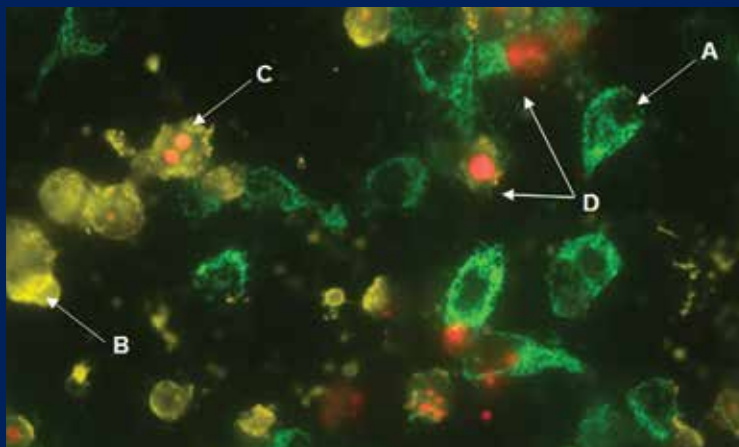
Utilizing Enzo's advanced in vitro assays, potential toxicity of drug candidates can be assessed early on.

GFP-CERTIFIED® Apoptosis/ Necrosis Detection Kit (ENZ-51002)

Distinguishing between apoptosis and necrosis provides valuable insights into the specific pathways through which a drug induces cell death, aiding researchers in assessing the safety and efficacy of potential drug candidates

- Readily distinguishes between healthy, early apoptotic, late apoptotic, and necrotic cells
- Optimized for both fluorescence microscopy and flow cytometry applications
- Specifically designed for use with GFP-expressing cell lines and cells expressing blue or cyan fluorescent proteins (BFPs, CFPs)

Distinguish Between Healthy, Early Apoptotic, Late Apoptotic, and Necrotic Cells



GFP-CERTIFIED® Apoptosis/Necrosis Detection Kit (ENZ-51002) detects four distinct cell states. Mitochondrial GFP-expressing HeLa cells were treated with 2 μ M Staurosporine for 4 hours. The apoptosis detection reagent (gold) and necrosis detection reagent (red) specifically detect cell states with clear spectral separation from mitochondria-associated GFP signal. Healthy cells (A), cells undergoing apoptosis (B), cells undergoing late-stage apoptosis (C), and necrotic cells (D).

Related Products

CYTO-ID® Autophagy Detection Kit

Cell Counting Kit-8

LDH Cytotoxicity WST Assay

NUCLEAR-ID® Blue/Green Cell Viability Reagent

SCREEN-WELL® Autophagy Library

DNA Damage ELISA Kit

ENZ -51031

ALX-850-039

ENZ-KIT157

ENZ-53004

BML-2837

ADI-EKS-350

Cellular Dysfunction

Understanding how drug candidates may impact critical cellular processes, aids in the prediction of the compound's overall effect on the cell. Compounds that induce significant dysfunction may pose risks to overall organism health, and early identification allows for appropriate adjustments in drug development.

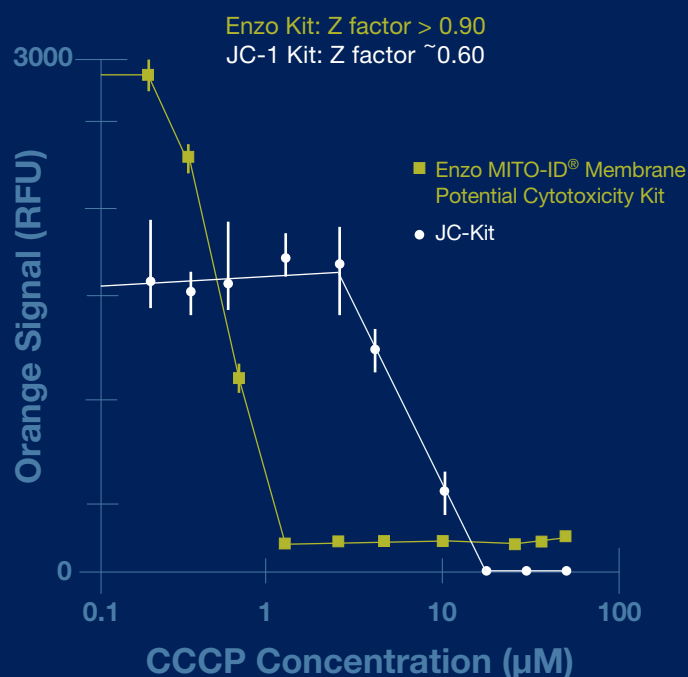
Enzo's CELLESTIAL® Assays for drug safety & *in vitro* toxicology provide a comprehensive set of solutions for monitoring cellular processes, aiding in tailoring drug development strategies to enhance therapeutic effectiveness.

MITO-ID® Membrane Potential Cytotoxicity Kit (ENZ-51019)

New drugs or compounds can selectively affect mitochondrial processes, such as membrane potential, reactive oxygen species (ROS) production, and calcium homeostasis, thus contributing to toxicity. Enzo's MITO-ID® Membrane Potential Cytotoxicity Kit is a real-time mitochondrial membrane potential assay suitable for time-course studies evaluating intact and compromised mitochondria

- 10x more sensitive than JC-1 with superior aqueous solubility
- Photostable dual-emission dye
- Suitable for high-throughput applications

MITO-ID® Dye is 10X More Sensitive Than JC-1



Detect mitochondrial perturbations with 10X more sensitivity than JC-1. Mitochondrial membrane potential (MMP) was evaluated in HeLa cells treated with CCCP using MITO-ID® dye (green) or JC-1 (white). Using a conventional fluorescence microplate reader, MMP was shown to decrease with increasing CCCP concentration as indicated by a decrease in orange fluorescence. Improved aqueous solubility of the dye and no-wash protocol minimizes variability, leading to a higher Z-factor (> 0.9) than that obtained with JC-1.

Related Products

MITO-ID® Membrane Potential Detection Kit	ENZ-51018
ROS-ID® Hypoxia/Oxidative Stress Detection Kit	ENZ-51042
ROS-ID® Total ROS/Superoxide Detection Kit	ENZ-51010
SOD Activity Kit	ADI-900-157
Cu/Zn-Superoxide Dismutase ELISA Kit	ALX-850-033-KI01
Cu/Zn SOD Polyclonal Antibody	ADI-SOD-100
Glutathione Peroxidase Activity Kit	ADI-900-158

Aggresomal Response

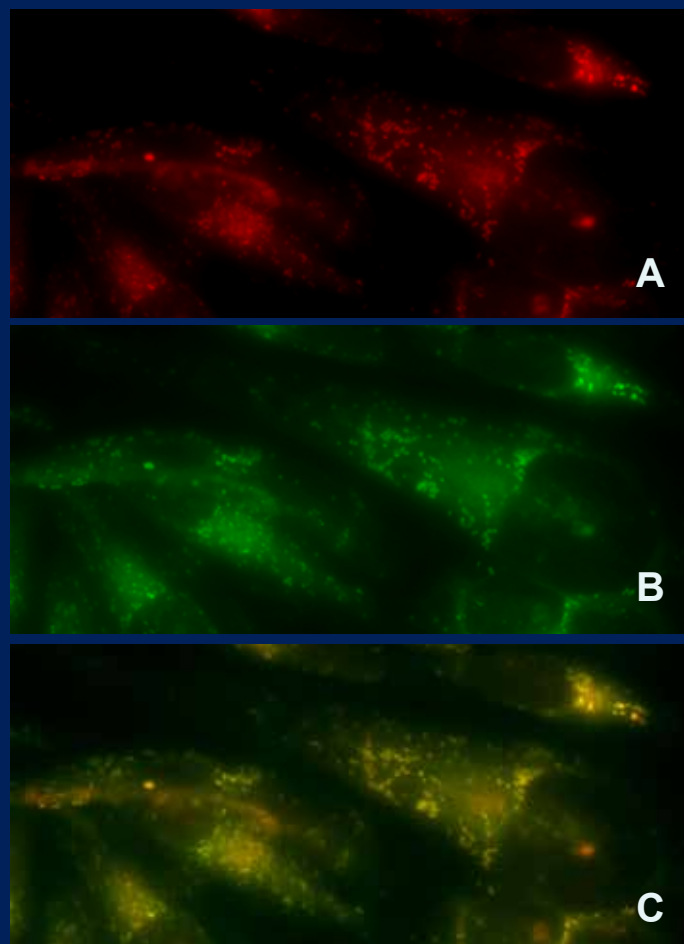
The presence of aggresomes, or inclusion bodies of misfolded and/or aggregated proteins, is often linked to cellular toxicity. Aggresomes may indicate cellular stress and dysfunction, allowing for the early identification of potential toxic effects induced by drugs or other substances.

PROTEOSTAT® Aggresome Detection Kit (ENZ-51035)

Detect and quantify aggresomes in cells using PROTEOSTAT® Aggresome Detection Kit, a robust and highly sensitive assay for toxicity assessment during drug discovery and development.

- Reliable and simple assay without the need for non-physiological protein mutations or genetically engineered cell lines
- Validated with small molecule modulators, demonstrating suitability for screening compounds of potential therapeutic value
- Useful for the study of toxicology, neurodegenerative diseases, liver disease, and much more

Detection of Aggresomes in HeLa Cells



Detection of aggresomes in HeLa cells, treated with proteasome inhibitor MG-132 for 12 hours with (A) PROTEOSTAT® Aggresome Detection Kit (ENZ-51035) (red), (B) aggresome marker p62 antibody conjugated with fluorescein (green). (C) Composite image shows co-localization of aggresomes and p62 (yellow).

Related Products

Proteasome ELISA Kit

p62 ELISA Kit

p62 (human) pAb

Proteasome Activator 11S Subunit Ab Sampler Pack

Proteasome Purification Kit

DNA Damage ELISA Kit

BML-PW0575

ADI-900-212

BML-PW9860

BML-PW8915

BML-2837

BML-PW1075A

Genotoxicity

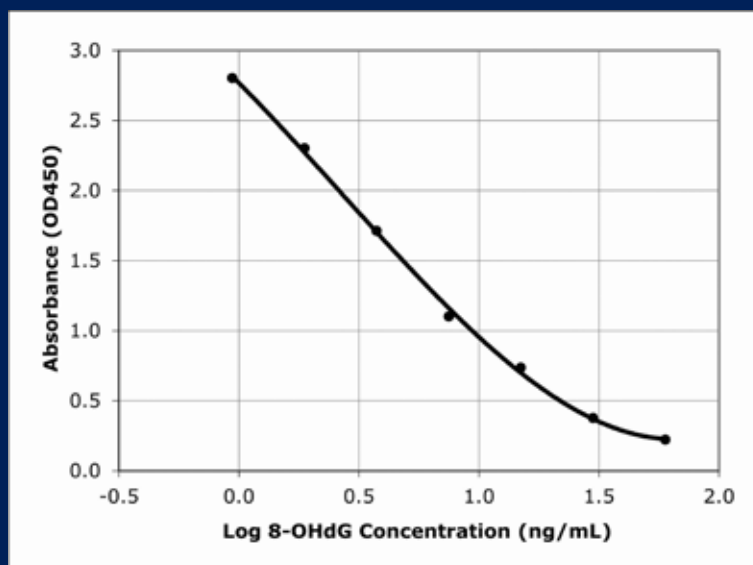
Identifying genotoxic drug compounds during early preclinical studies allows for further lead refinement and lower drug attrition. Mutagenesis, carcinogenesis, and adverse genetic effects, especially those that affect the germline, are routinely tested. Common assays for mutagenicity, both in vitro and in vivo, identify mutagenic hazards and mitigate risk for regulatory approval.

DNA Damage ELISA Kit (ADI-EKS-350)

Exposure of cells to oxidative and environmental stresses frequently results in the breakdown or oxidation of genomic DNA. DNA Damage ELISA kit is a colorimetric solution to evaluate the integrity of genomic DNA, or to assess the presence of oxidized DNA. It is frequently used as means of verifying the onset of apoptosis or DNA damage.

- Highly sensitive measurements, detecting as low as 1 ng/ml of 8-OHdG. Widely cited in peer-reviewed publications
- Also detects 8-hydroxyguanosine (product of oxidative RNA damage) and 8-hydroxyguanine (product of oxidative DNA damage by hydroxyl radicals)
- Reliable and validated in-house in a variety of sample matrices including serum, saliva, urine, plasma, cell lysates and DNA extracts

Sensitive Measurement of DNA Damage



Standard curve of DNA damage ELISA kit detecting as low as 1 ng/ml of 8-OHdG.

Related Products

Comet SCGE Assay Kit

BIOARRAY™ 5-hmC Methylation Kit

BIOARRAY™ Methylated DNA IP Kit

BIOARRAY™ Terminal Labeling Kit with Biotin-ddUTP for DNA Probe Array Assays

CYTAG® SuperCGH Labeling Kit

CYTAG® TotalCGH Labeling Kit

ADI-900-166

ENZ-45011

ENZ-45012

ENZ-42630

ENZ-GEN120




ENZ-42674

Organ-Specific Toxicity

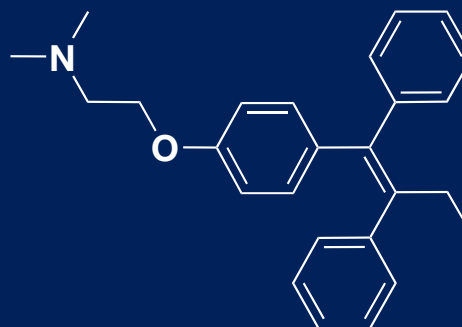
Understanding the potential toxicities directed at specific organs is paramount for ensuring the safety and efficacy of a drug candidate. This focused investigation allows to identify and mitigate risks associated with drug-induced harm to particular organs, contributing to the development of safer and more targeted pharmacological interventions.

SCREEN-WELL® Toxicity Libraries

Enzo's SCREEN-WELL® compound libraries are a unique collection of focused small molecules with defined and diverse organ-associated toxicity profiles. A variety of structurally and mechanistically different compound classes is included, as well as non-toxic controls.

-  Hundreds of compounds of defined and diverse toxicity
-  Essential standards for predictive toxicology screening
-  Individual bulk compounds and custom libraries available

Tamoxifen



Tamoxifen, a compound included in Enzo's SCREEN-WELL® Hepatotoxicity Library (BML-2851), is a selective estrogen receptor modulator (SERM), is commonly used in the treatment of hormone receptor-positive breast cancer. Considered generally safe and effective, it can occasionally cause hepatotoxicity. Tamoxifen and its metabolites can undergo bioactivation by cytochrome P450 enzymes, leading to the formation of reactive intermediates that can damage liver cells.

Related products

SCREEN-WELL® Cardiotoxicity Library
SCREEN-WELL® Hepatotoxicity Library
SCREEN-WELL® Hematopoietic Toxicity Library
SCREEN-WELL® Nephrotoxicity Library
SCREEN-WELL® Myotoxicity Library

BML-2850
BML-2851
BML-2852
ENZ-LIB100
ENZ-LIB101

Metabolic Abnormalities

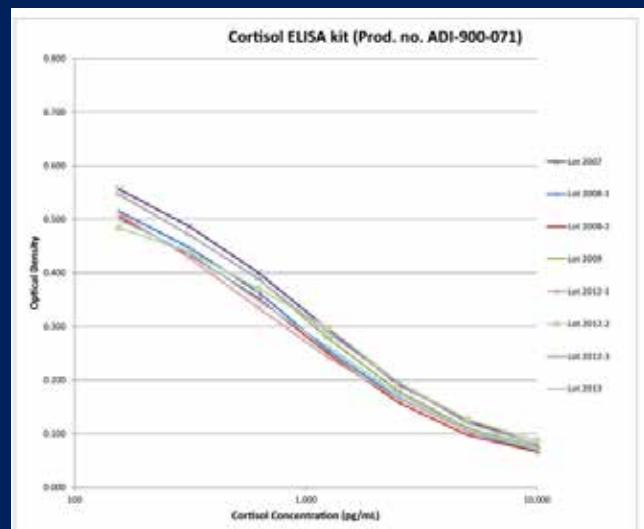
Drug-induced endocrine and metabolism disorders include electrolyte and calcium alterations, carbohydrate metabolism, thyroid and gonadal disorders. A critical understanding of endocrine effects can better predict drug-induced adverse effects for a better choice of drug design and treatment rationale.

Cortisol ELISA Kit (ADI-900-071)

Monitoring cortisol levels can provide valuable insights into the impact of drugs on the endocrine system and metabolic homeostasis. Changes in cortisol levels may indicate stress, alterations in energy metabolism, or potential adverse effects on the adrenal glands

- Detects low levels of cortisol in biological matrices including culture supernatants, plasma, serum, saliva, and urine from any species
- Highly cited in peer reviewed literature
- Lot-to-lot consistency

Accurately Detect Cortisol with Exceptional Consistency Across Multiple Production Lots



Lot-to-lot consistency graph demonstrates the robust and reproducible nature of the Cortisol ELISA kit (Prod. no. ADI-900-071) showing standard curves from 8 lots manufactured over 7 years.

Related products

cGMP Complete ELISA Kit	ADI-900-164
cGMP ELISA Kit	ADI-900-013
DHEA ELISA Kit	ADI-900-093
17 β -Estradiol High Sensitivity ELISA Kit	ADI-900-174
Testosterone High Sensitivity ELISA Kit	ADI-900-176
Corticosterone ELISA Kit	ADI-900-097

Enabling Your Safety Assessment

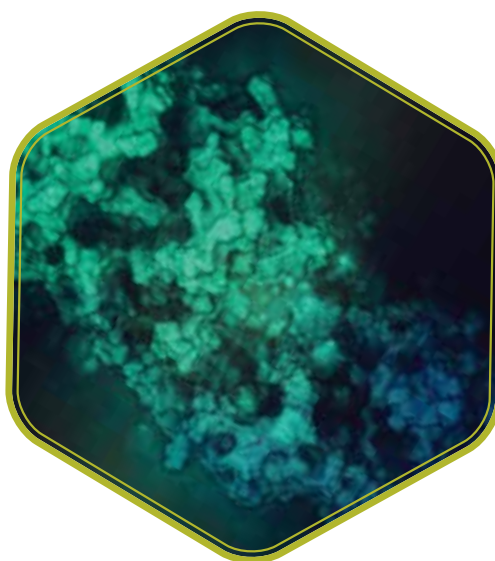
Reduce the risk of your drug discovery pipeline with our cell-based assays, activity kits, and reagents for mechanism and pathway analysis and biomarker detection. Enzo's broad range of scientific expertise and industry-proven manufacturing capabilities provides a comprehensive set of solutions for the toxicology market when determining cell viability, cellular dysfunction, genotoxicity, organ-specific toxicity and metabolic abnormalities

Enzo's offerings and solutions are designed to enhance operational efficiency, simplifying processes and increasing accessibility in the field of drug development. Our comprehensive Life Sciences Contract Services support the development of customizable, unique, and efficient solutions for all your drug development needs.



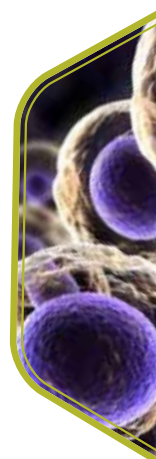
GENOMIC ANALYSIS

Nucleic Acid Extraction,
PCR, qPCR, and NGS

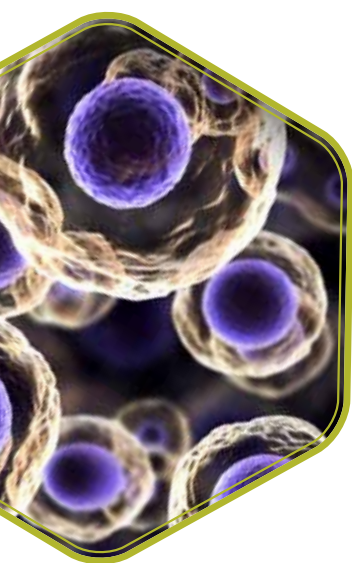


PROTEIN ANALYSIS

ELISA, Western Blot, Proteins,
Peptides, and Enzymatic Assays

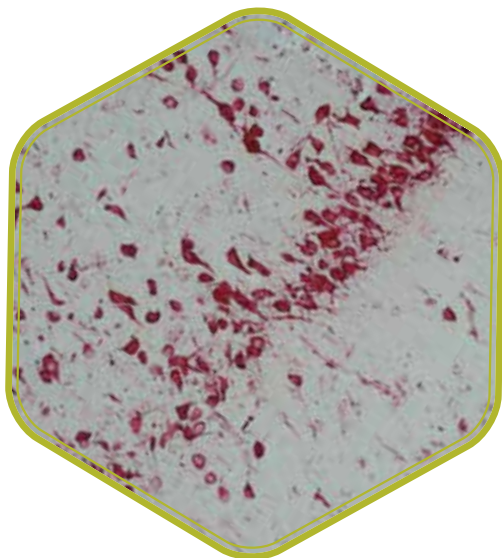


CELL
Cell-bas
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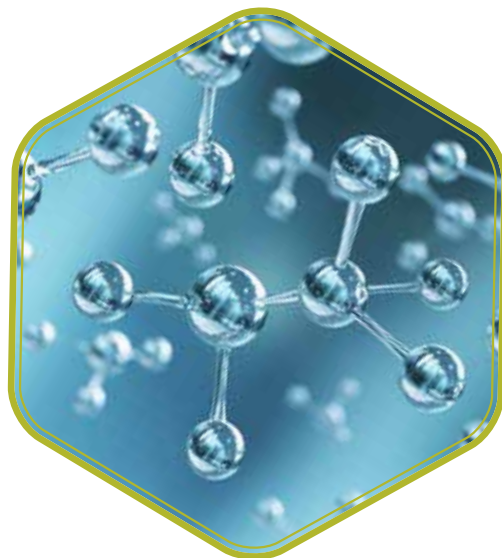
CELLULAR ANALYSIS

High-Throughput Assays, Fluorescent Assays, and Antibodies



TISSUE ANALYSIS

IHC, ISH, and FISH



SMALL MOLECULE CHEMISTRY

Small Molecules and Compound Libraries

Facilitating Predictive Toxicology to Ensure Drug Safety

We are driven by our commitment to serving our customers, and enabling their pursuit of innovation. Our customer-focused approach enables us to be true scientific partners. Our technological expertise enables our customers to achieve their next great discoveries. With over 500 patents, over 160,000 citations, rigorously validated products, world-class R&D and manufacturing, and teams of highly specialized expert scientists, we fuel the drug development efficiencies that lead the way to a healthier world.

Learn More at: enzolifesciences.com/toxicology

SCIENTISTS ENABLING SCIENTISTS™



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