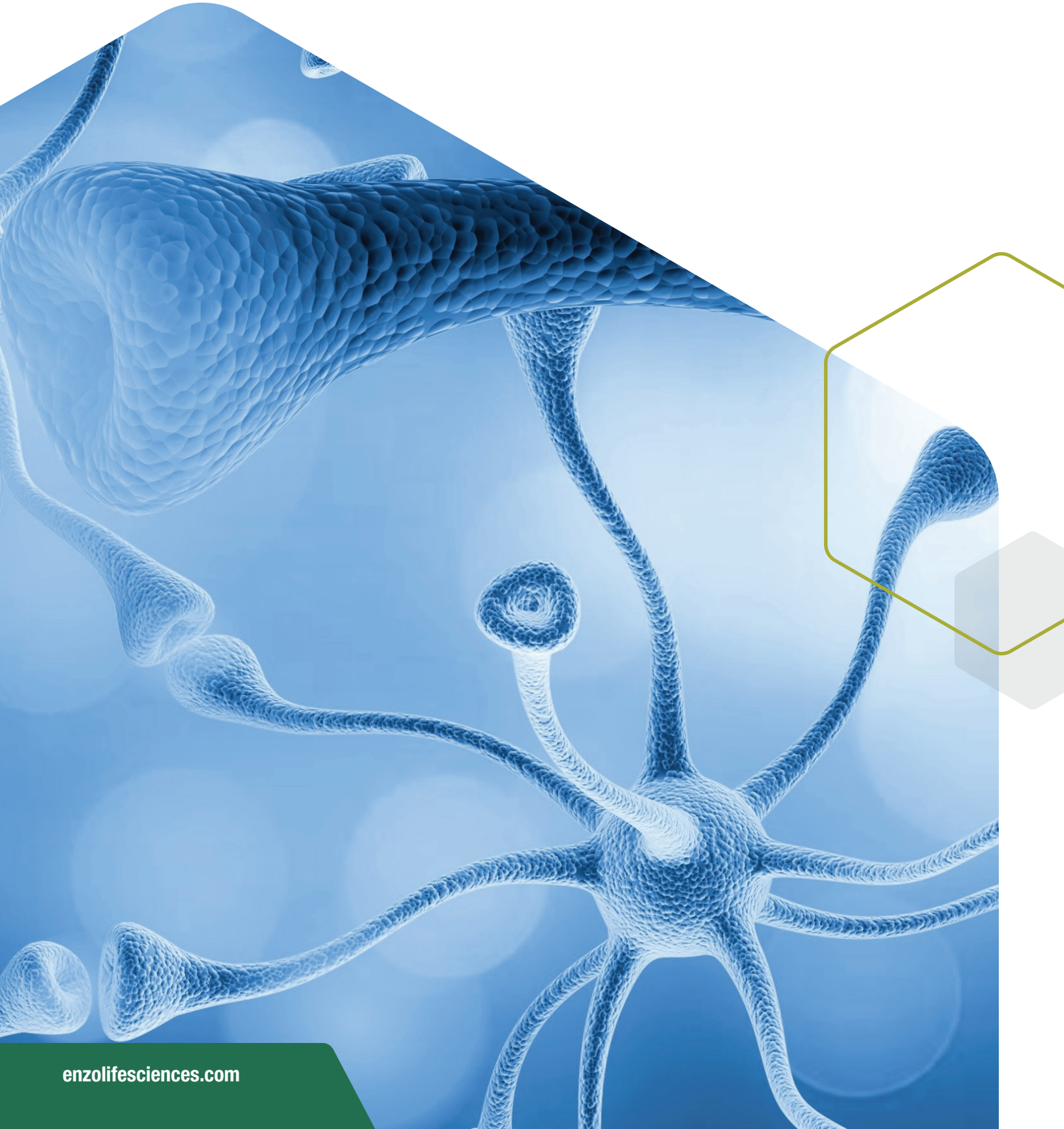




# Neurodegeneration

Your Partner for Neuroscience Research



# Introduction

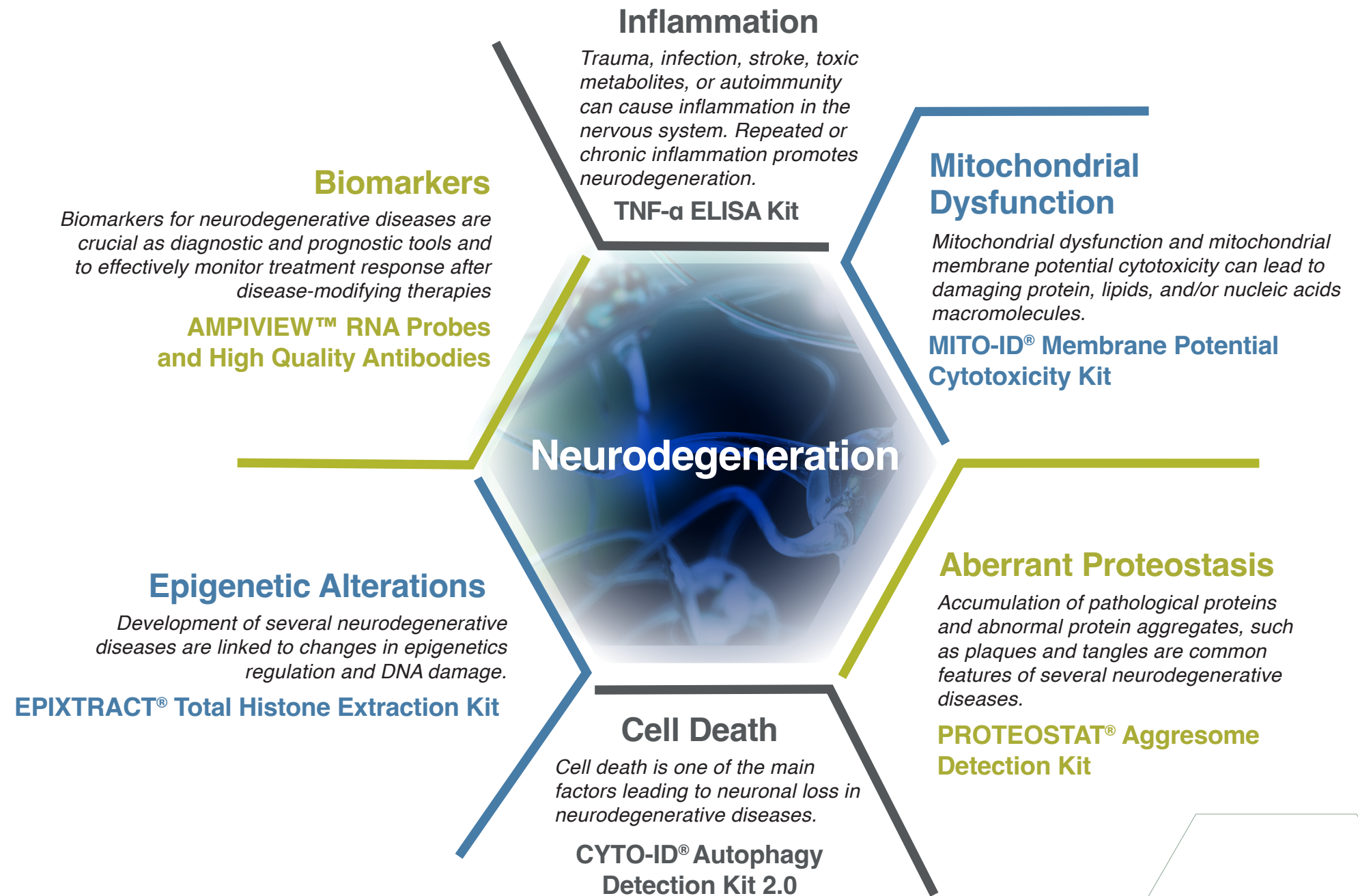
Neurodegeneration is a complex process, and at its core, it involves a series of triggers that gradually erode the structure and function of neurons, leading to a cascade of debilitating effects. Neurodegeneration manifestation includes progressive cognitive decline, which often manifests as a gradual decline in cognitive functions, affecting memory and other cognitive abilities. The common denominator of neurodegeneration is the progressive loss of neurons, which can result in brain atrophy and functional deficits.

For over 45 years, Enzo has been collaborating with researchers around the world, developing unique solutions to advance neurodegeneration research and accelerate next-generation therapies' development.

With our comprehensive catalog of unique products, we are committed to providing the tools and support you need to drive innovation and advancement in neuroscience.

**“For over 45 years, Enzo has been developing innovative tools to advance neuroscience research.”**

# Understanding the Molecular Mechanisms of Neurodegeneration



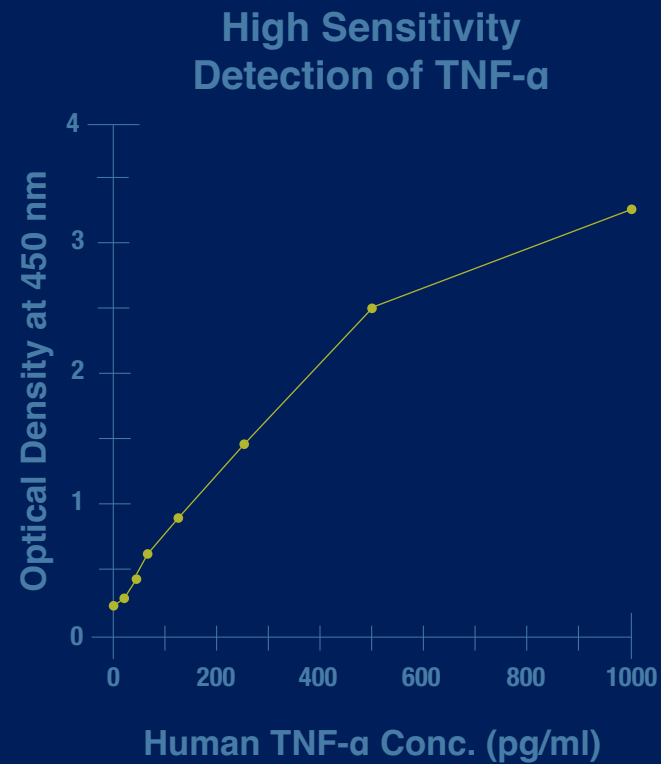
# Inflammation

Trauma, infection, stroke, toxic metabolites, or autoimmunity can cause inflammation in the nervous system. Repeated or chronic inflammation leads to cellular neuroinflammation. Pro-inflammatory cytokines such as TNF- $\alpha$ , IL-1 $\beta$ , and IL-6 IFN- $\gamma$  play a significant role in neurodegenerative disorders. For instance, TNF- $\alpha$  acts as a modulator in the acute phase of inflammation, triggering inflammatory cytokine signaling cascades.

## TNF- $\alpha$ (human) ELISA Kit (ADI-900-099)

Measure the primary mediator of immune regulation with the highly sensitive TNF- $\alpha$  ELISA Kit.

- Highly sensitive and specific assay that can detect as little as 8.4 pg/ml
- Validated in culture supernatant, plasma, and serum
- Lot-to-lot consistency to ensure reproducibility



TNF- $\alpha$  (human) ELISA kit can detect as little as 8.4 pg/ml.

## Related Products

IL-1 $\beta$ (human) ELISA Kit	ADI-900-130A
IL-10 (human) ELISA Kit	ADI-900-036
IL-6 (human), high-sensitivity ELISA Kit	ENZ-KIT178
VEGF (human) ELISA Kit	ENZ-KIT156
Monosodium Urate (NLRP3 Inflammasome Activator)	ALX-400-047
AIM2 (human) Monoclonal Antibody (3B10) Pack	ALX-804-891

# Mitochondrial Dysfunction

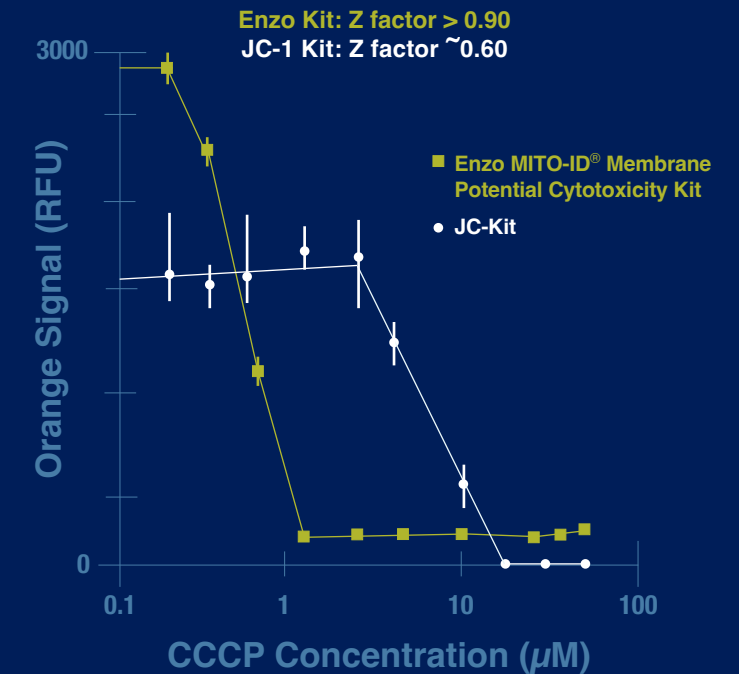
Several mitochondrial dynamic imbalances have been associated with neurodegeneration. Accumulation of toxic level of calcium in the mitochondria contributes to the dysregulation of homeostasis, leading to the release of apoptotic factors that can further contribute to cytotoxicity.

## MITO-ID<sup>®</sup> Membrane Potential Cytotoxicity Kit (ENZ-51019)

MITO-ID<sup>®</sup> Cytotoxicity Kit is a real-time assay that measures fluctuations in mitochondrial membrane potential with superior sensitivity.

- Superior sensitivity and improved solubility versus alternative dyes (JC-1 or JC-10) allowing toxicity detection at lower drug/dose concentration
- Highly validated for time-course studies evaluating intact and compromised mitochondria
- Photostable dual-emission dye

## MITO-ID<sup>®</sup> 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<sup>®</sup> 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

ROS-ID <sup>®</sup> Hypoxia/Oxidative Stress Detection Kit	ENZ-51042
FLUOFORTE <sup>®</sup> Calcium Assay Kit	ENZ-51017
MITO-ID <sup>®</sup> Green Detection Kit	ENZ-51022
MITO-ID <sup>®</sup> Red Detection Kit (GFP-CERTIFIED <sup>®</sup> )	ENZ-51007
Direct cAMP ELISA Kit	ADI-900-066
Direct cGMP ELISA Kit	ADI-900-014

# Aberrant Proteostasis

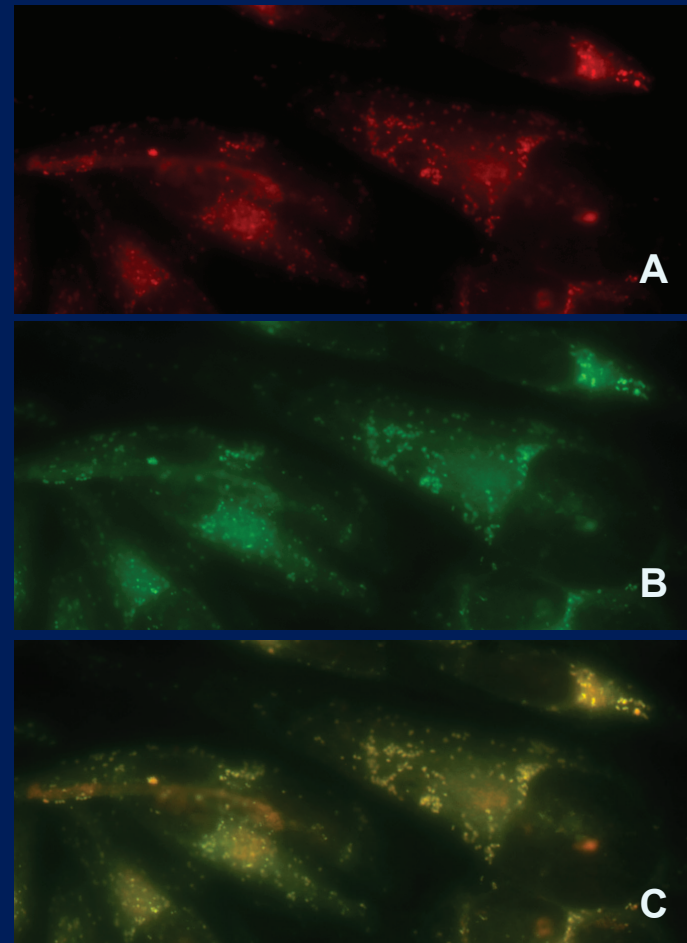
A subclass of neurodegenerative diseases is associated with dysregulation of proteins homeostasis or proteostasis. When cells cannot efficiently clear or degrade misfolded proteins, they aggregate and assemble in a dynamic and specialized structure called aggresomes or inclusion body. The aggresome is a protective mechanism within the cells to sequester and concentrate these aggregated proteins, thereby reducing their detrimental effects.

## PROTEOSTAT® Aggresome Detection Kit (ENZ-51035)

Detect and quantify misfolded proteins, aggregated proteins and aggresomes or inclusion bodies in cells with PROTEOSTAT® Aggresome Detection Kit.

- Provides a sensitive cell-based assay of drug responsiveness to identify inhibitors relevant to neurodegenerative diseases in an authentic cellular context
- Reliable and simple assay that does not require protein mutations or genetically engineered cell lines
- Validated under a wide range of conditions and with small molecule modulators demonstrating suitability for screening compounds of potential therapeutic value
- Fixed-cell assay allowing co-staining of PROTEOSTAT® with antibodies against a variety of targets such as protein aggregates, protein degradation machinery, etc.

## 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).

# Cell Death

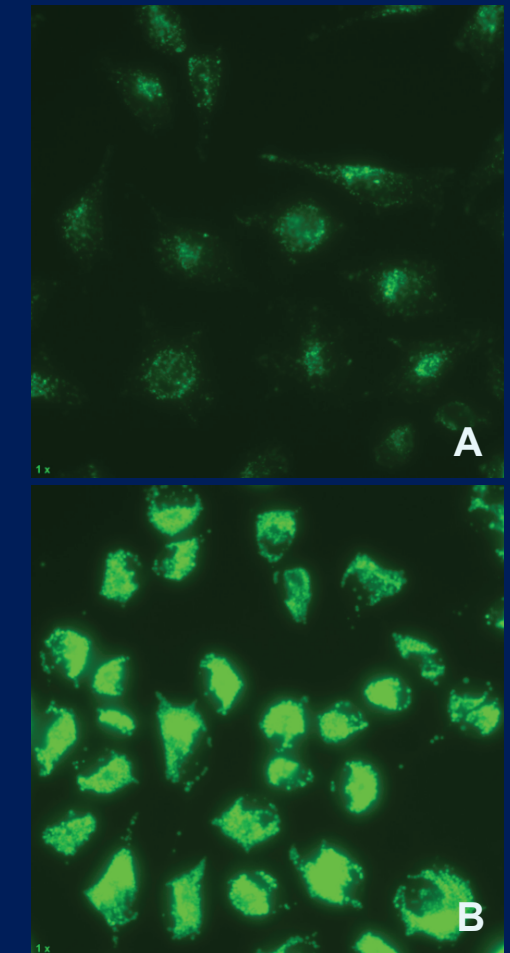
Cell death is one of the main factors leading to neuronal loss in neurodegenerative diseases. Neuronal cell death can be triggered by immune cells during inflammation, extreme impairment of mitochondria, overloaded autophagy pathways, or structural damage due to protein aggregates.

## CYTO-ID® Autophagy Detection Kit 2.0 (ENZ-KIT175)

Monitor autophagy in live cells with CYTO-ID® Autophagy Detection Kit 2.0, which contains a brighter and more photostable dye that specifically stains autophagic vesicles.

- Rapid, no transfection required and only 30 minutes of incubation
- Negligible staining of lysosomes reduces background seen with other dyes
- Facilitates high-throughput screening of activators and inhibitors of autophagy

## Quantify Autophagic Vacuoles Without Transfection



CYTO-ID® Autophagy Detection Kit 2.0 (ENZ-KIT175) used to detect autophagy in HeLa cells cultured in (A) media under normal conditions, (B) starvation media (EBSS) treated with 40uM Chloroquine for 4 hours. Starved cells show a higher quantity of autophagic vacuoles compared to cells under normal conditions (fluorescent green).

## Related Products

Proteasome ELISA Kit	BML-PW0575
p62 ELISA Kit	ADI-900-212
p62 (human) pAb	BML-PW9860
Proteasome Activator 11S Subunit Ab Sampler Pack	BML-PW8915
Proteasome Purification Kit	BML-PW1075A

## Related Products

SCREEN-WELL® Autophagy Library	BML-2837
GFP-CERTIFIED® Apoptosis/Necrosis Detection Kit	ENZ-51002
Rapamycin	BML-A275
Autophagy Protein 7, pAb	ADI-905-722
HSP90α (human) ELISA Kit	ADI-EKS-895

# Epigenetic Alterations

Changes in epigenetic regulation, such as altered DNA methylation, histone post-translational modification, and chromatin remodeling, may be involved in the development of several neurodegenerative diseases, including Alzheimer's and Huntington's disease.

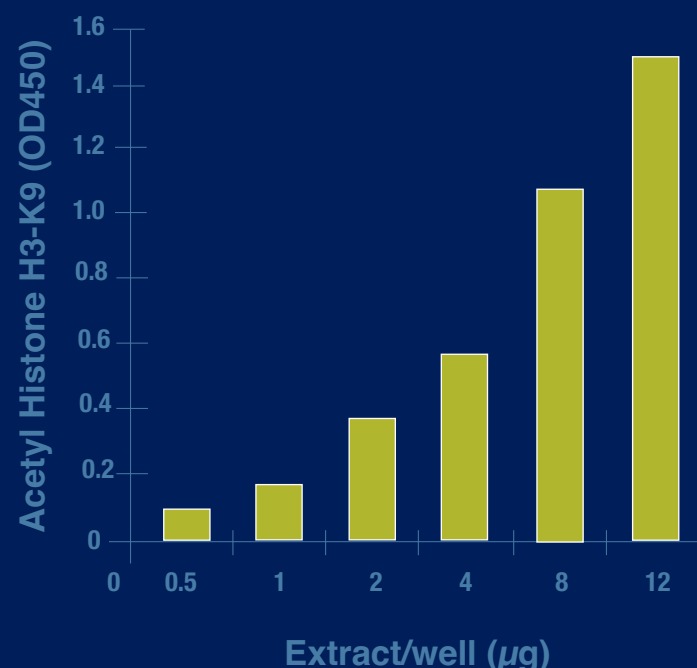
## EPIXTRACT® Total Histone Extraction Kit (ENZ-45014)

Isolate total histones from mammalian cells or tissues with EPIXTRACT® Total Histone Extraction Kit, which offers a rapid, and reliable method for various downstream applications.

EPIXTRACT® Total Histone Extraction Kit provides a simple and reliable method to isolate histone proteins in 1 hour. Extracts can be used for various downstream applications, such as post-translational modification assays.

- High Efficiency - extract histones from as low as  $10^5$  cells or 1mg tissue specimen
- Simple - optimized protocol with easy steps
- Reliable - reproducible results that keep post-translational modifications intact

## Quantification of Acetyl Histone H3-K9 from MCF-7 Cells



EPIXTRACT® Total Histone Extraction Kit (ENZ-45014) was used to extract histones from MCF-7 breast cancer cells to quantify histone 3-lysine 9 acetylation (H3-K9).

## Related Products

EPIXTRACT® Nuclear Protein Isolation Kit II	ENZ-45015
SCREEN-WELL Epigenetics Library	BML-2836
Blood and Tissue DNA Methylation Kit	ENZ-45004
AMPIGENE® Hot Start Taq DNA Polymerase	ENZ-NUC123
AMPIGENE® Hot Start Taq Mix	ENZ-NUC125

# Biomarkers

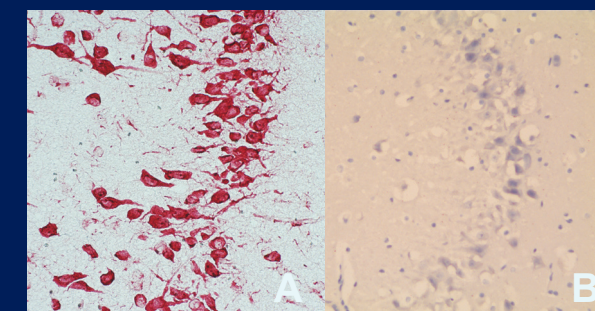
Biomarkers for neurodegenerative diseases are crucial as diagnostic and prognostic tools and to effectively monitor treatment response after disease-modifying therapies.

## AMPIVIEW™ RNA Probes for Neuroscience Research

AMPIVIEW™ RNA probes are uniquely designed with the precision of targeted, sequence-specific RNA, powered by Enzo's LoopRNA™ ISH technology to deliver superior sensitivity when combined with Enzo's immunocytochemistry detection solutions. With sample morphology preserved, the spatial localization of target biomarkers can be visualized under the light microscope.

- Detection of unique nucleic acid targets (DNA/RNA or RNA) down to a single cell level
- High sensitivity and specificity
- Adaptable products ready for any workflow (Manual or Automated)

## AMPIVIEW™ RNA Probes Delivers Superior Sensitivity and Specificity



Non-coding RNA activated by DNA damage (Norad) (red) detection in rat brain with (A) AMPIVIEW™ Norad (AS) Dig RNA probes (Mouse) and (B) AMPIVIEW™ NSP Dig RNA probes (negative control) with DIGX® anti-digoxigenin linker, POLYVIEW® PLUS AP reagent, HIGHDEF® Red AP Chromogen and HIGHDEF® Hematoxylin.

AMPIVIEW™ RNA Probes	Product #
AMPIVIEW™ Nestin RNA Probe Set (Rat)	ENZ-GEN135
AMPIVIEW™ Wnt5a (AS) Dig RNA	ENZ-GEN137
AMPIVIEW™ Norad (AS) Dig RNA Probes Set (Mouse)	ENZ-GEN178
AMPIVIEW™ Circ018 (AS) Dig RNA Probes Set (Mouse)	ENZ-GEN180
AMPIVIEW™ Ubiquitin + NSP Dig Controls Kit	ENZ-KIT223
AMPIVIEW™ GAPDH + NSP Dig Controls Kit	ENZ-KIT224
AMPIVIEW™ SARS-CoV-2 RNA Probes Set	ENZ-GEN159
AMPIVIEW™ SARS-CoV-2 RNA Probes Kit	ENZ-GEN158

## High-Quality Antibodies for Neurodegeneration Targets

The Enzo portfolio of neuroscience antibodies includes hundreds of monoclonal and polyclonal antibodies validated for various applications, including immunohistochemistry (IHC) and immunocytochemistry (ICC) methods. Major targets include markers of neurodegenerative disease, ion channels, neurotransmitters and their receptors, neurofilament and cytoskeletal targets, synaptic vesicle markers, and more. Each of our high quality antibodies is backed by our Worry-free Antibody Trial Program.

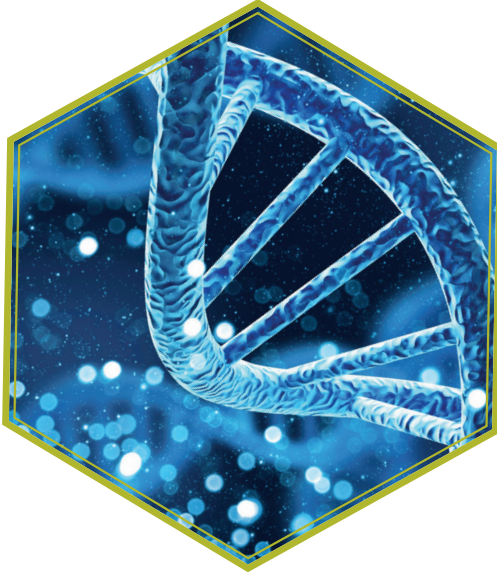
## Neurodegenerative Markers

Product Name	Product #
14-3-3 tau/theta pAb,	BML-SA481
$\alpha$ -Synuclein (human), mAb (15G7)	ALX-804-258
$\alpha$ -Synuclein, pAb	BML-SA3400
APP, mAb (3E9)	ADI-NBA-100
APP, pAb	ADI-NBA-102
BACE2 (NT), pAb	ADI-905-290
CD39 (human), mAb (AC2.5)	ENZ-ABS233
CD39L1 (human), pAb	ALX-215-045
CD39L1 (mouse), pAb	ALX-215-044
Clusterin (human), mAb (CLI-9)	ALX-804-126
GSK-3 $\alpha$ / $\beta$ , mAb (1H8)	ADI-KAM-ST002
GSK-3 $\beta$ , pAb	ADI-KAP-ST002
Huntingtin pAb	BML-PW0595A
Tau (human) pAb (TAUY9)	BML-TA3119
Tau (human), mAb (Tau 12)	ENZ-ABS216

# Neuroscience Tools that Drive Discovery

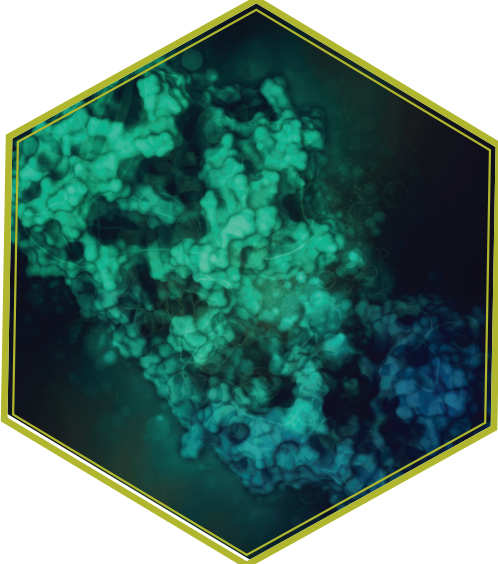
Enzo has first-hand experience with unique research challenges. As an integrated biotechnology and life sciences company, we take pride in delivering dependable products and services to advance your neuroscience research from discovery to clinical trials. Our extensive experience manufacturing over 20,000 life science products and technologies gives us the capability to create and build complete workflows.

Rely on over 45 years of innovation, technology development, and manufacturing know-how to support your neuroscience studies, no matter how small or complex they may be. Our comprehensive Life Sciences Contract Services supports the development of customizable, unique, and efficient solutions for all your research needs.



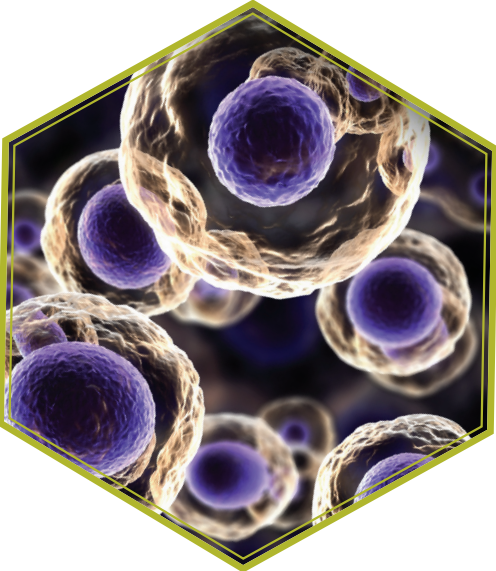
### GENOMIC ANALYSIS

Nucleic Acid Extraction, PCR, qPCR, and NGS



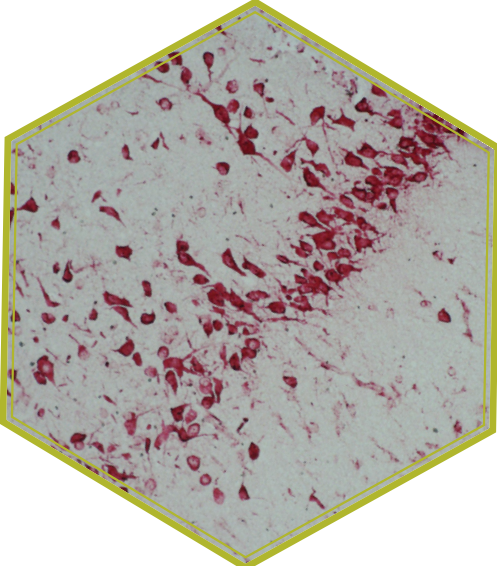
### PROTEIN ANALYSIS

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



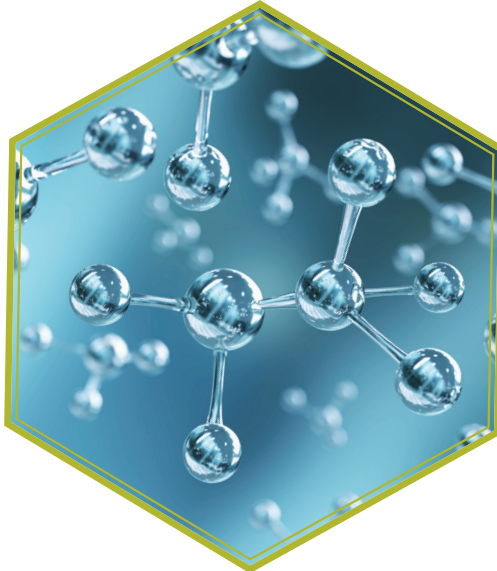
### CELLULAR ANALYSIS

Cell-based Assays, Fluorescent Dyes, and Antibodies



### TISSUE ANALYSIS

IHC, ISH, and FISH



### SMALL MOLECULE CHEMISTRY

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