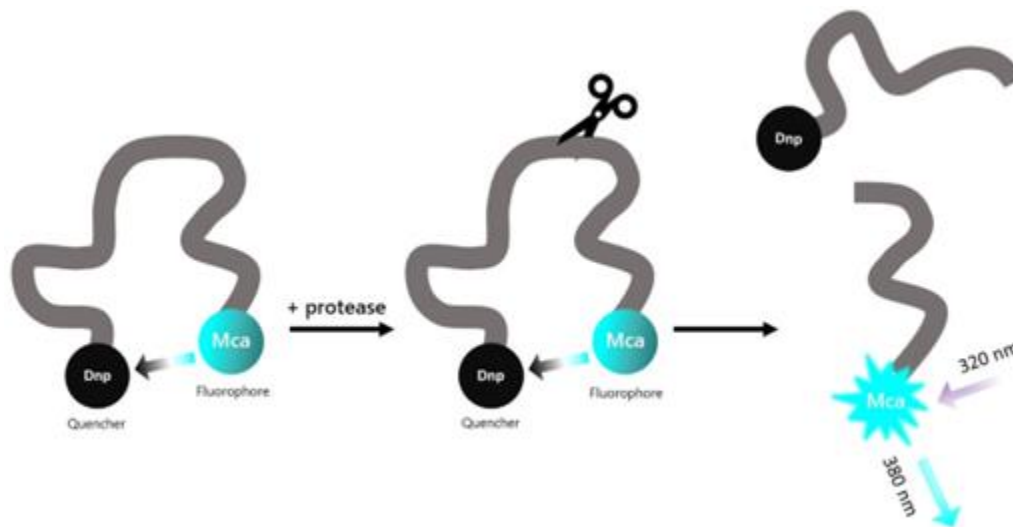


## Description

The Cathepsin S Inhibitor Screening Assay Kit is designed to measure the protease activity of Cathepsin S for screening and profiling applications. The Cathepsin S assay kit comes in a convenient 96-well format, with enough purified Cathepsin S (amino acids 17-331), its substrate, and Cathepsin Buffer for 96 reactions. This kit includes the inhibitor E-64 as control.



*Figure 1: Illustration of the assay principle.*

The substrate is an internally quenched fluorogenic substrate. Proteolysis releases the highly fluorescent Mca from the quencher. Fluorescence intensity increases proportionally to the activity of the protease.

## Background

Cathepsin S is a cysteine protease of the C1 papain family, found inside the lysosomal/endosomal compartments of antigen-presenting cells such as B cells, macrophages, and dendritic cells. Cathepsin S participates in the degradation of antigenic proteins to peptides for presentation. Contrary to other cathepsins, Cathepsin S functions at neutral pH and it is secreted in response to inflammatory triggers. Its activity is regulated by cystatin C, its endogenous inhibitor. Cathepsin S has additional biological effects, acting as one of the most potent elastases, cleaving a number of extracellular matrix (ECM) proteins. Its role as elastase contributes to blood vessel permeability and angiogenesis. High levels of this protein can be found in psoriatic keratinocytes and pulmonary fibrosis, and it has also been linked to nociception. The development of inhibitors targeting Cathepsin S can prove beneficial in the treatment of pulmonary fibrosis and other Cathepsin S-linked diseases.

## Applications

Screen small molecule inhibitors in high throughput screening (HTS) applications.

**Supplied Materials**

Catalog #	Name	Amount	Storage
80008	Cathepsin S, His-Tag*	10 µg	-80°C
80349	Fluorogenic Cathepsin Substrate 1 (5 mM)	10 µl	-80°C
	4x Cathepsin Buffer	2 ml	-20°C
	0.5 M DTT	200 µl	-80°C
	1 mM E-64	10 µl	-80°C
79685	96-well black microplate	1	Room Temp

\* The concentration of protein is lot-specific and will be indicated on the tube containing the protein.

**Materials Required but Not Supplied**

- Adjustable micropipettor and sterile tips
- Fluorescence plate reader capable of measurement at  $\lambda_{ex}330/\lambda_{em}390$  nm.

**Stability**

This assay kit will perform optimally for up to **6 months** from date of receipt when the materials are stored as directed.

**Safety**

This product is for research purposes only and not for human or therapeutic use. This product should be considered hazardous and is harmful by inhalation, in contact with skin, eyes, clothing, and if swallowed. If contact occurs, wash thoroughly.

**Assay Protocol**

- All samples and controls should be performed in duplicate.
  - The assay should include “Negative Control”, “Positive Control”, “Control Inhibitor” and “Test Inhibitor” conditions.
  - We recommend maintaining the diluted protein on ice during use.
  - For detailed information on protein handling please refer to Protein FAQs ([bpsbioscience.com](http://bpsbioscience.com)).
1. Add 120 µl of **0.5 M DTT** to 2 ml of **4x Cathepsin Buffer**.
  2. Prepare 1x Cathepsin Buffer by diluting 4x Cathepsin Buffer 4-fold with distilled water.
  3. Thaw **Cathepsin S**, on ice. Briefly spin the tube to recover the full content.
  4. Dilute Cathepsin S to 1 ng/µl in 1x Cathepsin Buffer (20 µl/well).
  5. Prepare the Test Inhibitor (5 µl/well): for a titration prepare serial dilutions at concentrations 10-fold higher than the desired final concentrations. The final volume of the reaction is 50 µl.

5.1 If the Test Inhibitor is water-soluble, prepare 10-fold more concentrated serial dilutions of the inhibitor than the desired final concentrations in 1x Cathepsin Buffer.

For the positive and negative controls, use 1x Cathepsin Buffer (Diluent Solution).

**OR**

5.2 If the Test inhibitor is soluble in DMSO, prepare the test inhibitor at a concentration 100-fold higher than the highest desired concentration in 100% DMSO, then dilute the inhibitor 10-fold in 1x Cathepsin Buffer to prepare the highest concentration of the 10-fold intermediate dilutions. The concentration of DMSO is now 10%.

Using 1x Cathepsin Buffer containing 10% DMSO to keep the concentration of DMSO constant, prepare serial dilutions of the Test Inhibitor at 10-fold the desired final concentrations.

For positive and negative controls, prepare 10% DMSO in 1x Cathepsin Buffer (vol/vol) so that all wells contain the same amount of DMSO (Diluent Solution).

*Note: The final concentration of DMSO should not exceed 1%.*

6. Add 20  $\mu$ l of diluted Cathepsin S to all wells, except the "Negative Control" wells.
7. Add 20  $\mu$ l of 1x Cathepsin Buffer to the "Negative Control" wells.
8. Dilute 10-fold the 1 mM E-64 solution with 100% DMSO to get a 100  $\mu$ M solution.
9. Dilute 10-fold the 100  $\mu$ M E-64 solution with 1x Cathepsin Buffer to get a 10  $\mu$ M solution.
10. Add 5  $\mu$ l of inhibitor solution to each well designated "Test Inhibitor".
11. Add 5  $\mu$ l of Diluent Solution to the "Positive Control" and "Negative Control" wells.
12. Add 5  $\mu$ l of diluted E-64 (10  $\mu$ M) to the "Control Inhibitor" wells.
13. Preincubate the inhibitors with the diluted Cathepsin S for 30 minutes at Room Temperature (RT) with gentle agitation.
14. Dilute 500-fold the Fluorogenic Cathepsin Substrate 1 in 1x Cathepsin Buffer (25  $\mu$ l/ well).
15. Start the reaction by adding 25  $\mu$ l of the diluted Substrate to all wells. Protect your samples from direct exposure to light.
16. Incubate at RT for 60 minutes or perform kinetic analysis.
17. Read fluorescence intensity of the samples (lexcitation = 360 nm; lemission = 460 nm) in an appropriate microplate reader.

Component	Negative Control	Positive Control	Control Inhibitor	Test Inhibitor
1x Cathepsin Buffer	20 $\mu$ l	-	-	-
Test Inhibitor	-	-	-	5 $\mu$ l
Diluent Solution	5 $\mu$ l	5 $\mu$ l	-	-
Diluted E-64 (10 $\mu$ M)	-	-	5 $\mu$ l	-
Diluted Cathepsin S (1 ng/ $\mu$ l)	-	20 $\mu$ l	20 $\mu$ l	20 $\mu$ l
30 minutes at Room Temperature				
Diluted Fluorogenic Cathepsin Substrate 1 (500-fold)	25 $\mu$ l	25 $\mu$ l	25 $\mu$ l	25 $\mu$ l
<b>Total</b>	<b>50 <math>\mu</math>l</b>	<b>50 <math>\mu</math>l</b>	<b>50 <math>\mu</math>l</b>	<b>50 <math>\mu</math>l</b>

### Example Results

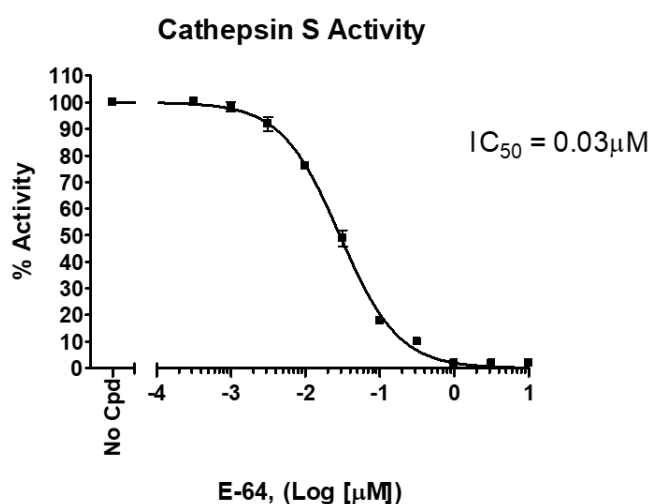


Figure 2: Inhibition of Cathepsin S activity by E-64.

Cathepsin S activity was measured in the presence of increasing concentrations of E-64. Results are expressed as percent of control (Cathepsin S activity in the absence of inhibitor, set at 100%).

Data shown is representative. For lot-specific information, please contact BPS Bioscience, Inc. at [support@bpsbioscience.com](mailto:support@bpsbioscience.com)

### Troubleshooting Guide

Visit [bpsbioscience.com/assay-kits-faq](https://bpsbioscience.com/assay-kits-faq) for detailed troubleshooting instructions. For all further questions, please email [support@bpsbioscience.com](mailto:support@bpsbioscience.com)

### References

Yoo Y., et al., 2022 *Biomedicine & Pharmacotherapy* 145: 112245.

**Related Products**

<i>Products</i>	<i>Catalog #</i>	<i>Size</i>
Cathepsin D, His-Tag Recombinant	101391	10 µg
Cathepsin B, His-tag Recombinant	80001	10 µg
Cathepsin D Inhibitor Screening Assay Kit	82141	96 reactions/384 reactions
Cathepsin B Inhibitor Screening Assay Kit	79590	96 reactions/384 reactions